AUGUST 14, 1943

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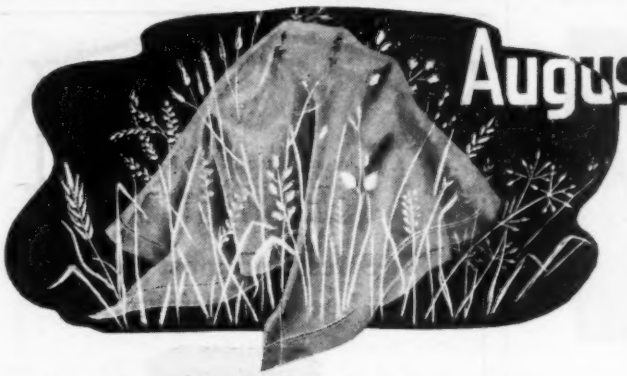

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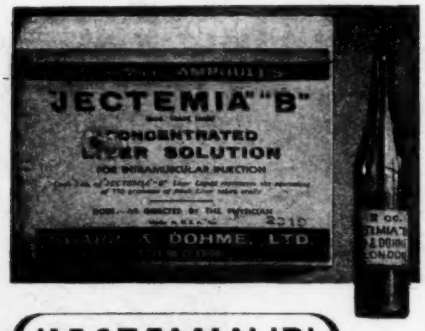

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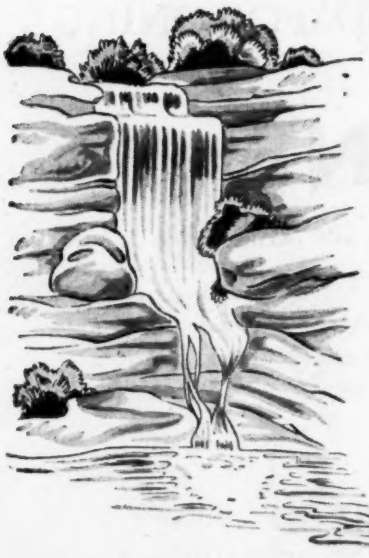

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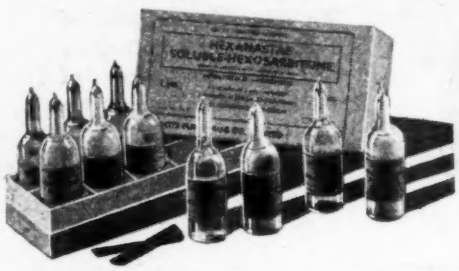

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Increasing experience shows that a low level of maternal nutrition may be responsible for many of the disturbances which have hitherto been regarded as inevitable accompaniments of pregnancy. Apart from the demands of the developing fœtus on the mother's resources, vomiting and anorexia, so common in the early stages of pregnancy, often result from low B_1 intake and in turn markedly increase the deficiency.

One authority has recently stated that mild, and often neglected, complications such as œdema and "pins-and-needles" may well be due to hypovitaminosis B. Another suggested that the pains in the back and legs, and instability in walking, sometimes seen during pregnancy, are possibly early signs of vitamin D deficiency. Dental caries, anæmia, and cramps may also be manifestations of inadequate nutrition generally.

It is readily understandable, too, that the extra demands of pregnancy may render more apparent other recognised signs of vitamin deficiency, such as anorexia, constipation and diarrhœa, ready mental and physical fatiguability, and emotional instability.

SAFER PREGNANCY AND PUERPERIUM

The addition of vitamins and mineral salts to the diet of expectant mothers has a profound influence on the course of pregnancy and labour and on the well-being of the new-born child. This has been placed above all controversy by the results of recent large-scale and well-controlled clinical experiments.

Investigations carried out in London,[1] involving a study of the records of over 5,000 pregnant women, showed that there was a dietary deficiency of vitamins A, B_1 and C in about 50 per cent. of cases, of calcium in 70 per cent., and of iron in 98 per cent.

CONTROLLED INVESTIGATIONS

After the provision of supplements containing adequate amounts of vitamins A, B complex, C and D, with calcium, iron, iodine, manganese and copper, the following significant results were noted:—

Among 1,530 primigravidæ the toxæmia rate was 27.1 per cent. as compared with the rate of 31.7 per cent. in a control group of 1,512 primigravidæ not receiving the supplement. Based on an annual birth-rate of 600,000, this represents a possible reduction of 10,000 cases of toxæmia per annum by the use of a pre-natal diet adequate in vitamins and mineral elements. Noteworthy, too, was the effect on the new-born infant, as shown by a definite reduction in the number of premature births.

Similar results obtained by investigations at the Toronto General Hospital,[2] showed that a good, or supplemented, pre-natal diet resulted in better health for the mother, a reduced incidence of toxæmias, miscarriages, premature births, or still-births, with a decrease in the morbidity and mortality of the infant during the early months of life.

A COMPREHENSIVE SUPPLEMENT

Since it is apparent that vitamin deficiency in pregnancy is usually multiple, the importance of ensuring a sufficient intake of all the known vitamins and essential mineral salts is obvious. Since, moreover, it is of primary importance that the mother be in as good a state of nutrition as possible, from the very beginning of pregnancy, attention should be paid to the quality of the diet in the early months, and, because the drain caused by pregnancy and lactation may possibly be greater than was anticipated, protective measures are advisable until several weeks after lactation is completed.

Pregnavite, the first preparation to contain vitamins and mineral salts, in correct amounts and proportions to meet the requirements of pregnancy, is the most convenient and economical means of supplementing the diet of the expectant and nursing mother.

PREGNAVITE in recommended doses supplies, at time of manufacture, approximately:—

Vitamin A	4,000 i.u.	Calcium	350 mg.
Vitamin B_1	200 i.u.	Phosphorus	550 mg.
Vitamin C	400 i.u.		
Vitamin D	300 i.u.	Available Iron	12 mg.

1 *Brit. Med. J.* 1942. 2. 77.
2 *J. Nutrit.* 1941, 22. 515. *Canad. Med. Assoc. J.* 1942, 46. 1 and 6.

Further particulars concerning Pregnavite sent to medical men on application to Vitamins, Ltd. (Dept. L.P.P.), 23, Upper Mall, London, W.6.

TOXICITY OF TANNIC ACID

AN EXPERIMENTAL INVESTIGATION

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(*Illustrations on Plate*)

WE report an experimental investigation into the toxicity of tannic acid and the chances of its absorption from burned areas. Some information about the fate of tannic acid after it reaches the circulation is given and contrasted with the behaviour of gallic acid.

Our experiments have been carried out on goats, rabbits, guineapigs and rats, 250 animals being used in all. Tannic acid (*BP*) was obtained from 7 different firms, one such sample being employed for most of the experiments, the others being tested for toxic action on the organs alone. This main sample contained about 20% gallic acid.

AVERAGE LETHAL DOSES OF TANNIC ACID

1. *LD 50* [1] *of tannic acid.*—Table I summarises the results of giving tannic acid by intravenous and subcutaneous routes. A 5% solution in distilled water was used. The LD 50 in each case is as follows :—

		mg./kg.		mg./kg.
Goat	subcutaneous dose	300	intravenous dose	20
Rabbit		1000		10
Guineapig		500		
Rat ..		1500		

The rat is the most resistant animal, the guineapig and goat the least. The high ratio between subcutaneous and intravenous doses suggests that there is slow absorption from and most likely precipitation in the subcutaneous tissues.

TABLE I—LD 50s OF TANNIC ACID GIVEN INTRAVENOUSLY AND SUBCUTANEOUSLY

Species and route	Dose (mg./kg.)	No. of animals	No. dying	Mortality (%)	Survival (days)
Subcutaneous					
Goat ..	500	3	3	100	1, 3, 3
	300	2	1	50	13
	100	3	0	0	..
	50	3	0	0	..
Rabbit ..	1000	5	4	80	3, 3, 4, 5
	500	5	0	0	..
Guineapig	1000	5	4	80	5, 5, 6, 7
	500	5	5	100	3, 5, 6, 6, 8
	250	5	0	0	..
	100	3	0	0	..
	50	3	0	0	..
	25	3	0	0	..
	15	3	0	0	..
Rat ..	1500	5	3	60	1, 1, 2
	1000	5	1	20	2
	500	8	2	25	1, 1
	250	8	0	0	..
	100	3	0	0	..
	50	3	0	0	..
	25	3	0	0	..
	15	3	0	0	..
Intravenous					
Goat ..	20	2	1	50	1
	15	2	0	0	..
	10	6	0	0	..
Rabbit ..	100	4	4	100	All died immed.
	50	3	3	100	10 min.; 10 min.; 3 hr.
	25	3	2	67	25 min; 30 min.
	20	5	3	60	1, 1, 7
	15	3	2	67	11, 16
	10	3	2	67	8, 8
	5	3	0	0	..

Immed. = immediately.

PATHOLOGICAL CHANGES PRODUCED BY TANNIC ACID

Animals were given 5% tannic acid solution both intravenously and subcutaneously and by spraying burned surfaces. Careful autopsies were performed on all animals dying and on survivors 4 weeks after administration of tannic acid. Some animals were killed at short intervals so as to follow the pathological course. Material from heart, lungs, liver, kidneys, adrenals, spleen, stomach, small and large intestines, genital organs, sites of subcutaneous injection and skin application, and bone-marrow (but not the nervous system) were fixed in 10% formol saline, 10% formol alcohol, Susa, and buffered formalin; frozen and paraffin sections were prepared, and stained with Ehrlich's acid hæmatoxylin and eosin, Weigert's iron hæmatoxylin and van Gieson, Weigert's elastic stain, Mallory's aniline-blue orange-G method, scharlach R, Turnbull's Jenner method for bone-marrow, and in a few instances with Best's carmine method for glycogen after absolute-alcohol fixation.

Intravenous injection of fatal doses of tannic acid resulted in death within a few minutes or after several days. Rapidly fatal cases showed sudden collapse, convulsions, coma and death from respiratory failure. The most striking features at autopsy in these were dilatation of the heart and blood-vessels and coagulation of the blood. Delayed cases gave no clinical signs at or after injection beyond loss of appetite and a steady loss of weight. Post-mortem appearances resembled those seen after subcutaneous injection. Accordingly, we give a general description of this group since individual variations are slight.

Such animals were noticeably quiet, refusing food though taking water, often in large amounts. Diarrhœa often developed in a day or two and persisted throughout the course of the illness. Wasting was severe, sometimes extreme. No eye changes were noted. Respiration became hurried and shallow towards the end, especially when pulmonary œdema occurred. A short period of unconsciousness preceded death; convulsions were not noted in the delayed cases.

At autopsy the animal appeared wasted and often showed evidence of diarrhœa and staining of the fur with urine. The site of subcutaneous injection was grossly œdematous especially in the first 3 days, later œdema was much less obvious and a good deal of fibrin was present, with a fairly severe acute inflammation. In a few instances there was breakdown of the tissues.

The *heart* was often dilated, both ventricles being affected, and scattered petechiæ and larger hæmorrhages were present in the epicardium of auricles and ventricles. The heart muscle was often pale and in the longer cases showed fatty change. Large veins of the neck and thorax were congested.

The *lungs* were usually distended with air, mottled with petechiæ or large hæmorrhages which were commonest in the pleural tissues of the lower lobes. Hæmorrhages in the substance of the lungs were uncommon. Pulmonary œdema was seen in some animals, most often in those dying within 2 or 3 days after injection of tannic acid. There were no cases of pneumonia. Pleural fluid was seldom increased; one goat developed acute fibrinous pleurisy and mediastinitis. We noted a tendency of the lungs to stick to the parietal pleura when the chest was opened and occasionally were able to refer this to a very fine layer of fibrin on the pleuræ. Trachea and bronchi showed no changes in their walls. Bronchial glands were normal.

The *liver* in acute cases appeared swollen, congested and soft, with rounded edges; after 24–48 hours it was mottled with small, sometimes confluent, areas of yellow or grey necrosis, which were most numerous along the edges of the organ. In guineapigs, hæmorrhage in the liver was common. Throughout the later stages areas of necrosis were much more difficult to pick out, being masked by congestion. The *gall-bladder* was distended with dark green bile but no lesions were found in its wall, nor were the bile-ducts and pancreas affected. The *kidneys* were usually swollen, pale with a broad indistinct or blurred cortical pattern and very congested medulla. The capsule stripped with ease leaving a bulging mottled surface. No changes were noted in the pelves, ureters, bladder and genital organs. The *spleen* was often small, pale and collapsed as if depleted of blood in the early deaths, but normal or congested in the later stages. No gross change was detected in the lymph glands and bone-marrow. The *stomach* contained much partly digested food, its wall being congested and sometimes showing scattered mucosal hæmorrhages or erosions. A little altered blood was then apparent in the gastric cavity. Small hæmorrhages were sometimes found in the mucous coat of the small and large intestines, but no ulceration was noted. Large gut content often was fluid especially when the animal died in the first 3 days after administration of

1. Average dose which will kill off 50% of animals in 2–3 days.

tannic acid. A true enteritis however was not seen. Peritoneal effusion, rich in plasma proteins, often occurred in animals receiving subcutaneous injection of tannic acid and amounted in some small animals to 10 c.cm. Guineapigs were especially liable to this lesion. Goats, too, showed ascites, with large masses of gelatinous material in the omentum and mesentery. Such effusions were most often seen in animals dying within 2 or 3 days of injection.

The *brain* and spinal cord presented no obvious abnormality beyond a certain "dryness" in the early stages of poisoning and some far from constant congestion.

We noted no tendency on the part of tannic acid to terminate pregnancy in our female animals.

Similar autopsy findings, though less severe, were found in animals given smaller doses of tannic acid by similar routes and deliberately killed at intervals for study of the pathological process.

Microscopic examination confirmed the presence of pulmonary œdema in a proportion of cases, cloudy swelling and fatty change in the heart muscle of most animals, and very mild degenerative change in the mucosal epithelium of the stomach and intestines, amounting to erosion when associated with mucosal hæmorrhage. In a few rabbits we came across recent thrombi in the swollen pulmonary veins and arteries; in one such case lung infarction had developed and in another, surviving 20 mg. per kg. tannic acid intravenously, canalisation of a thrombus was noted. These changes were, however, inconstant and unimportant compared with those seen in the liver and kidneys.

The *liver* is often severely damaged after the administration of tannic acid. During the first 5 hours after subcutaneous or intravenous injection of moderate or large doses there was no apparent change beyond a diminution of the glycogen content of the organ. Histological assessment of glycogen content is notoriously difficult despite care in pre-experimental feeding, investigation of controls and attention to technical details; so that we place no emphasis on this observation. Mitochondrial disturbance, likewise, is difficult of interpretation. We note the suggestive fact that mitochondria in liver cells grouped around the central vein of the lobules often appear in process of breaking up from threads into granules and are sometimes missing. From the 5th hour onwards, clearcut evidence of damage of liver cells appears terminating in coagulation necrosis of the centres of the lobules uniformly distributed throughout the organ (fig. 1). Bordering upon these areas are groups of liver cells rich in fat granules and globules. By the end of the first 24 hours these changes are generally widespread, resulting in the conversion, when the dose of tannic acid is large, of the greater part of the liver into a mass of necrotic cells rimmed by marrow zones of healthy or fat-containing liver cells. Cytolytic necrosis soon makes its appearance and during the second and third days of intoxication reaches a maximum (fig. 2). From then onwards, either the animal dies, apparently from acute hepatic insufficiency, or regeneration of liver tissue commences (fig. 3), sometimes to be interrupted by death at a later stage, sometimes proceeding to complete recovery. The goat and guineapig are especially suitable for studying these changes. In no instance could we detect pathological change in the bile-ducts nor lesions in the blood-vessels of the portal canals. In one or two cases we found thrombi in the intrahepatic branches of the portal vein, but these were late in origin and were of secondary importance.

Regeneration proceeds concurrently with removal of dead liver cells by cytolysis and absorption and to some extent through phagocytosis (figs. 4, 5, 6). At an early stage the margins of the necrotic material are infiltrated by polymorphonuclear leucocytes, though seldom to a considerable degree. From the second day onwards, mononuclear cells increase in numbers until they far exceed the polymorphs. Proliferation of reticulo-endothelial cells (Kupffer cells) contributes to this mononuclear infiltration and occasionally, in the later stages, multinucleated giant cells are formed. Regeneration results from the ingrowth of new liver cells, the product of surviving marginal tissue, mitotic figures being numerous in this region. New formation of connective tissue is slight so that, as a rule, complete recovery follows without the production of scar tissue in the liver. The speed of regeneration is determined in the first instance by the amount of initial damage and by species differences. With large but sublethal doses of tannic acid administered subcutaneously the goat completely regenerated its liver in about 10 days, the rabbit, guineapig and rat in 6–8 days. Success in regeneration depends to a great extent on uniformity in distribution of the initial damage throughout the lobules. With fusion of adjacent areas of necrosis, resulting in the formation of large confluent infarct-like masses of dead liver, removal and replacement is a much slower affair and often lingers on for many weeks. Moreover, such areas constitute a real danger because of their susceptibility to secondary infection or to spreading thrombosis throughout near-by normal liver areas.

Renal changes, though constant in our experience, are slight and of short duration. They develop in about 24 hours and include cloudy swelling and slight fatty change in the convoluted tubule cells and lining epithelium of Henle's loops. In several instances goats showed necrosis of tubules when liver damage was very severe. Glomeruli appear unaffected. Granular and fatty casts are sometimes present for a short time, but by the fourth day the kidney has returned to normal, and no permanent structural damage persists.

Some evidence of *bone-marrow* stimulation is found in the form of recently developed hæmatopoietic foci among the fatty marrow of goats. Œdema of the marrow may be present, especially after intravenous injection of tannic acid.

From the pathological investigation, we conclude that tannic acid when introduced into the circulation by the subcutaneous or intravenous routes acts primarily on the liver cells and to a much less extent on renal epithelium, damaging or destroying them according to the concentration reached.

We have also paid some attention to the local effects produced by subcutaneous injection of tannic acid in small divided doses. Within 24 hours, œdema is extensive at and around the site of injection, often taking the form of a firm gelatinous mass extending for considerable distances in directions apparently determined by gravity.

In an attempt to obtain a rough quantitative idea of the severity of œdema, we dissected out the anterior abdominal muscle of 10 normal 500 g. guineapigs, injected with normal saline and 8 guineapigs injected with 500 mg./kg. tannic acid administered as a 5% solution, which is almost isotonic. Sites of injection and amounts of muscle corresponded in the two experiments, and similar amounts of fluid were used. Dr. F. C. Courtice kindly determined the wet weight and water content of the muscle. The mean weight of the normal group was 8·32 g. of the tannic injected group 16·21 g., an increase of 7·89 g. The mean increase in water was 7·01 g. In 24 hours, therefore, the injected site showed a 95% increase in weight, 89% of the increase being due to water. Histological examination shows that tannic acid induces necrosis of the muscle and to a much less extent of collagen fibres, followed by acute inflammation which may persist for weeks. Granulation tissue appears in 3–5 days; scarring may be severe. Muscle-cell regeneration is often apparent after a couple of weeks. We have noted the presence of thrombosed vessels at an early stage in some animals. The inflammatory reaction proceeds in the absence of infection and is no doubt the result of the coagulative action of tannic acid on the tissue proteins.

BLOOD CHANGES DUE TO TANNIC ACID

We have studied the hæmoglobin percentage (Haldane's method) red and white cell counts (Bürker counting-chamber), hæmatocrit value (modified Lovatt Evans' method, using 10 capillary tubes), and differential white-cell count of goats, rabbits, guineapigs, and rats after subcutaneous and in a few instances intravenous injection of 5% tannic acid solution. Tables II and III summarise these results. Dr. Courtice estimated the blood-volume (T. 1824 dye method using a spectrophotometer), plasma proteins and non-protein-nitrogen (NPN) in a number of our animals. Figs. 7 and 8 show some representative curves.

Subcutaneous injection of large amounts of tannic acid leads to a rise in hæmoglobin percentage, red-cell count and hæmatocrit value within 24 hours, associated with a fall in total blood-volume and plasma-volume but little or no change in total corpuscular volume. It may thus be suggested that plasma is lost from the circulating blood with resulting hæmoconcentration. At the same time there is a fall in the plasma-protein percentage. This, we believe, indicates an increased permeability for proteins on the part of the capillaries somewhere in the body and is the reason for the loss of plasma. We have previously pointed out that œdema at the site of subcutaneous injection of tannic acid is usually severe and there is little doubt that it may account for the hæmoconcentration in many animals. Ascites is also a contributory

factor and much less often pulmonary œdema; indeed, there may be a widespread leakage of plasma from capillaries since we have found the same sort of blood changes in a few animals after intravenous injection of tannic acid and in this instance there was no localised œdema as with subcutaneous injection.

But permeability alteration is not the whole story. With decreasing subcutaneous doses of tannic acid we reach a stage, at any rate in goats, where there is no evidence of hæmoconcentration, yet a definite fall in plasma proteins occurs. Thus in goats 68 and 69 injected subcutaneously with 50 mg. per kg. tannic acid the plasma proteins fell from 5·0 and 6·6% to 4·2 and 5·8% respectively in 5–24 hours, returning to normal soon afterwards; no definite evidence of hæmoconcentration was present in goat 69, while goat 68 showed only a moderate increase in hæmoglobin and red cells. Such observations may indicate a direct effect of tannic acid on plasma protein production or stabilisation, possibly through an action on the liver, but this is merely conjecture.

The possibility of plasma proteins being removed because of precipitation by tannic acid has to be considered. Tannic acid, as we show later on, soon disappears from the circulation when injected intravenously

TABLE III—MEAN HÆMOGLOBIN PERCENTAGES AND RED-CELL COUNTS AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID

Species	No. in group	Dose (mg./kg.)	Before injection		5 hr. after		24 hr. after	
			Hb. %	Red cells (mills. c.mm.)	Hb. %	Red cells (mills. c.mm.)	Hb. %	Red cells (mills. c.mm.)
Rabbit ..	4*	1000	75	6·17	82	6·55	88	6·83
	4†	500	71	6·08	70	6·23	74	6·18
Guineapig	12	500	93	5·94	121	7·28	84	6·25
	5‡	250	88	..	94	..	90	..
	5‡	100	88	..	95	..	90	..
Rat ..	5	1000	105	8·57	119	10·91	125	10·80

* 3 showed hæmoconcentration, 1 did not.
† 1 showed hæmoconcentration. ‡ 2 showed hæmoconcentration.

—long before alterations in plasma-protein content appear. With subcutaneous injection, the tannic acid concentration in the blood is not sufficient to precipitate plasma proteins, for in-vitro tests have shown that a plasma level of 100 mg. tannic acid per 100 ml. must be

TABLE II—BLOOD CHANGES IN GOATS (FOUR GROUPS OF 3 GOATS EACH) AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID (TA)

Time	Goat no.	Hb. %	Red cells (mills. c.mm.)	Hæmatocrit %	Leucocytes (thousands/c.mm.)	Blood volume			Plasma proteins (g. per 100 ml.	Non-protein nitrogen (mg. per 100 ml.)
						Plasma vol. (c.cm.)	Total corpuscular vol. (c.cm.)	Total blood vol. (c.cm.)		
Before injection	16	68	12·86	27·5	9·2	1418	534	1952	5·8	40
	17	61	12·98	23·6	22·6	1152	362	1514	5·1	36
	18	64	14·18	22·7	11·4	1507	443	1950	6·7	32
5 hr. after 500 mg./kg. TA	16	102	18·21	..	10·6	..	..	..	5·5	44
	17	73	17·28	..	20·4	..	..	..	5·2	36
	18	85	18·16	..	21·2	..	..	..	6·5	34
24 hr. after	16	110	19·58	39·7	13·8	1110	730	1840	5·2	92
	17	74	..	28·7	27·6	979	391	1370	4·7	52
	18	135	21·29	38·3	23·4	1295	805	2100	4·3	98
48 hr. after	16	84	16·83	35·6	13·6	1620	900	2520	4·8	183
	17 (18d.)	60	13·56	22·1	17·8	1295	365	1660	4·5	129
72 hr. after	17 (16d.)	60	12·13	23·7	20·8	1288	397	1685	5·8	160
4 days after	17	55	12·22	..	15·6	..	..	..	5·7	170
5 days after	17	55	13·60	..	32·0	..	..	..	5·6	185
7 days after	17	48	..	..	31·6	..	..	..	5·9	180
10 days after	17 (d. 11th day)	..	..	..	..	..	..	..	6·5	210
Before injection	13	82	16·72	..	7·2	..	..	..	..	..
	14	70	15·16	..	17·8	..	..	..	..	..
	15	48	6·93	..	7·6	..	..	..	..	..
5 hr. after 500 mg./kg. TA	13	108	20·24	..	16·6	..	..	..	..	..
	14	96	17·08	..	29·6	..	..	..	..	..
	15	60	9·17	..	11·6	..	..	..	..	..
24 hr. after	13	115	23·21	..	11·4	..	..	..	..	..
	14	106	16·81	..	10·4	..	..	..	..	..
	15	62	13·97	..	7·8	..	..	..	..	..
2 days after	13	98	20·19	..	15·14	..	..	..	..	..
	14	90	18·94	..	14·4	..	..	..	..	..
	15	54	10·17	..	6·2	..	..	..	..	..
3 days after	13	100	20·01	..	16·0	..	..	..	..	..
	14	102	18·94	..	16·0	..	..	..	..	..
	15	46	10·17	..	8·8	..	..	..	..	..
4 days after	13	100	20·83	..	17·2	..	..	..	..	..
	15 (14d.)	42	9·61	..	7·6	..	..	..	..	..

d. = died; k. = killed.

Time	Goat no.	Hb. %	Red cells (mills. c.mm.)	Hæmatocrit %	Leucocytes (thousands/c.mm.)	Blood volume			Plasma proteins (g. per 100 ml.)	Non-protein nitrogen (mg. per 100 ml.)
						Plasma vol. (c.cm.)	Total corpuscular vol. (c.cm.)	Total blood vol. (c.cm.)		
Before injection	58	65	11·05	..	13·2	..	..	..	6·9	32
	59	54	7·77	..	8·2	..	..	..	7·1	27
	60	70	14·32	..	9·8	..	..	..	8·2	24
5 hr. after 100 mg./kg. TA	58	74	11·00	..	12·0	..	..	..	7·0	32
	59	56	8·48	..	15·2	..	..	..	6·4	30
	60	82	16·02	..	22·8	..	..	..	8·2	30
24 hr. after	58	74	12·86	..	9·8	..	..	..	5·7	40
	59	54	10·30	..	9·6	..	..	..	5·7	30
	60	98	19·97	..	17·4	..	..	..	6·8	38
2 days after	58	68	9·75	..	7·6	..	..	..	6·1	47
	59	50	10·28	..	7·0	..	..	..	5·3	37
	60	80	13·07	..	14·6	..	..	..	7·0	34
3 days after	58	63	11·36	..	10·8	..	..	..	..	42
	59	38	8·14	..	10·2	..	..	..	6·4	37
	60	65	11·27	..	16·2	..	..	..	7·3	30
5 days after	58	60	10·52	..	16·2	..	..	..	6·6	29
	59	34	6·41	..	14·2	..	..	..	6·4	25
	60	72	14·95	..	20·6	..	..	..	7·0	25
7 days after	58	60	11·09	..	10·0	..	..	..	6·8	30
	59 (60k.)	24	4·44	..	10·8	..	..	..	6·5	27
9 days after	58	54	10·97	..	14·2	..	..	..	6·7	31
	59	21	4·01	..	12·2	..	..	..	7·6	31
Before injection	67	68	18·13	..	12·4	..	..	..	6·0	37
	68	68	13·81	..	13·6	..	..	..	5·0	35
	69	56	13·84	..	15·6	..	..	..	6·6	41
5 hr. after 50 mg./kg. TA	67	66	18·0	..	13·0	..	..	..	5·9	37
	68	75	16·09	..	17·0	..	..	..	4·2	37
	69	60	14·9	..	17·8	..	..	..	7·4	40
24 hr. after	67	67	19·73	..	22·0	..	..	..	5·3	37
	68	76	16·28	..	15·8	..	..	..	4·9	42
	69	62	14·06	..	16·4	..	..	..	5·8	45
2 days after	67	60	16·46	..	15·4	..	..	..	6·5	35
	68	70	17·64	..	11·2	..	..	..	5·5	37
	69	62	12·46	..	7·8	..	..	..	6·9	37
3 days after	67	58	16·56	..	13·2	..	..	..	6·4	42
	68	74	16·36	..	13·0	..	..	..	5·6	42
	69	62	14·03	..	7·0	..	..	..	8·2	32
4 days after	67	57	16·17	..	14·4	..	..	..	7·0	40
	68	74	17·37	..	15·2	..	..	..	6·5	45
	69	64	11·79	..	7·6	..	..	..	8·5	32
5 days after	67	62	16·86	..	10·6	..	..	..	6·4	40
	68	70	17·32	..	16·2	..	..	..	5·7	37
	69	58	13·67	..	5·8	..	..	..	7·2	34

reached before precipitation of protein commences. No such level is approached in our experiments, and we do not consider that direct precipitation by tannic acid is of importance in explaining the plasma-protein variation.

A rising NPN value is often seen and seems to be correlated with the severity of poisoning. With large doses of tannic acid, especially when fatal, high NPN levels are reached; with smaller doses there may be a transitory increase with return to normal in a few days. The explanation for this phenomenon is obscure. It might be the result of renal insufficiency, though we have not been impressed by the renal damage noted microscopically. In the absence of investigation of renal function we cannot, however, exclude this possibility. Another suggestion is that the rising NPN value is due to increased protein katabolism. The body-weight commonly falls as the NPN rises. Many observers have remarked on the association of loss of weight, rise in blood-urea, oliguria and increased urinary excretion of urea in conditions of anhydræmia, the result of simple dehydration, intestinal obstruction, diarrhœa from many causes, injection of hypertonic sucrose (Marriot 1923). Diarrhœa has been a feature in some of our animals, but was far from constant. Salivation did not occur. Another factor may well have been the breakdown of plasma proteins lost through local œdema at the site of injection, ascites or pulmonary œdema. Dr. Courtice informs us that when 100 c.cm. of rabbit's serum is injected subcutaneously into a normal rabbit, the urea output definitely increases though the blood-urea value remains unaltered. It is obvious that more work needs to be done on this problem before a satisfactory explanation can be reached.

Leucocytosis has been a constant finding in our animals after subcutaneous injection of tannic acid. It may appear as early as 3 hours, being preceded sometimes by a fall in leucocytes. At 24 hours the white count is generally high though some animals have shown a normal or even decreased count, only to increase at 48 hours. Leucocytosis may persist for several weeks, whilst the local inflammation is going on. Polymorphonuclear leucocytes are chiefly concerned in the increase, and there is evidence of bone-marrow stimulation. No doubt products of necrosis produced at the site of injection of tannic acid play a part in the leucocytic response, but there is evidence that leucocytosis also follows on intravenous injection of tannic acid so that the possibility of a direct action on the bone-marrow cannot be excluded.

We conclude from these experiments that tannic acid in large doses induces local loss of blood-plasma, sometimes plasma loss in quite diverse parts of the body with resulting hæmoconcentration and accompanying rise in blood NPN. We suggest that this is evidence that tannic acid may act as a capillary poison, both locally and when absorbed into the circulation.

Absorption of tannic acid from normal tissue, and burned surfaces.—So far our investigation might be dismissed as one of scientific interest only, with little bearing on reality. The main question asked by the practical person is whether tannic acid can be absorbed from a tanned burn in amounts sufficient to induce the injurious effects we have described.

To answer this question it is necessary to present evidence: (1) of the presence of tannic acid in the blood after tanning burnt areas; (2) of the occurrence of systemic effects under such conditions; and (3) that the blood tannic acid is capable of producing injurious effects. If such an association be established, it is reasonable to conclude that a case has been built up against tannic acid. Further, it might be possible to define the conditions under which serious effects due to tannic acid are to be expected.

TABLE IV—BLOOD "TANNIC ACID + GALLIC ACID" OF GOATS AFTER INTRAVENOUS INJECTION OF TANNIC ACID

Readings before injection were all negative

Dose	Goat no.	"Tannic + gallic acid" (mg./100 c.cm. plasma) after injection (mins.)								
		1	5	15	30	90	120	180	270	360
10 mg./kg. TA as 5% solution	70	11·7	10·7	7·0	5·5	4·2	4·0	2·4	..	..
	71	11·0	13·0	10·2	8·7	5·2	3·7	2·0	0·15	..
	72	15·2	11·2	9·5	6·7	5·5	3·7	3·2	0·15	0
	73	14·2	13·2	9·7	9·0	6·2	5·0	4·7	4·2	0·17
	74	13·5	13·0	10·5	9·5	6·5	5·5	3·5	2·5	0·17
	88	16·7	11·0	8·5	7·5	6·0	5·2	4·7	0·2	0·17

Estimation of tannic acid in blood.—The key to our investigation lies in the establishment of a satisfactory means of estimation of the minute amounts of tannic acid likely to be encountered in body fluids—especially blood. Tannic acid is a precipitant of proteins and polypeptides, but the complexes formed are very slightly soluble if the tannic acid is not in excess and certain substances found in biological fluids are present. Under such conditions, minute quantities of tannic acid may circulate in the blood-stream in a soluble condition.

After a practical survey of the possible methods, we decided to use the ferric chloride reaction as a means of estimation since it is very sensitive and gives reproducible results.

This method consists in measuring the depth of bluish-purple colour given when small amounts of ferric chloride are added to plasma. The colour is most readily measured in the Spekker photoelectric absorptiometer. The instrument is fitted with a red filter to neutralise the effect of any hæmolysis. Since the ferric tannic complex quite readily precipitates from the plasma solution, to obtain a constant reproducible colour it is maintained in colloidal solution by the incorporation of a protective colloid. The colour produced is affected by the pH of the solution, but in plasma this is maintained constant by the buffering power of the proteins present.

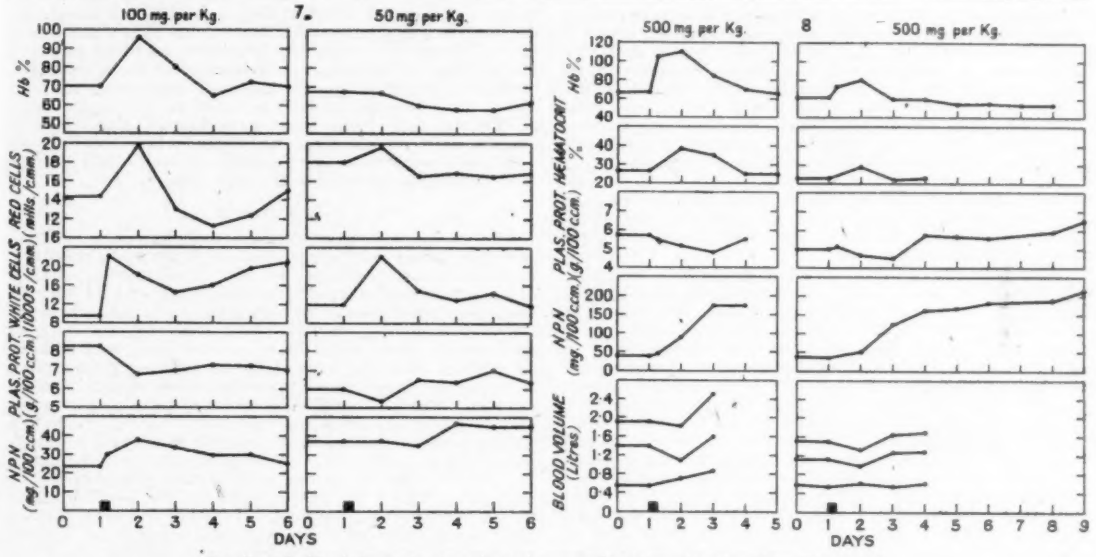
The amount of ferric chloride added must be very small, since excess causes precipitation of the proteins and consequent turbidity. Below the precipitation limit the amount of iron salt added does not affect the colour, provided that there is sufficient to form the complex. The colour produced reaches its maximum after a few minutes and is quite stable for at least 6 hours. The method is standardised by taking normal plasma and adding to it varying amounts of tannic acid and measuring the absorption in the Spekker after addition of ferric chloride. In practice it is best to make two readings—(*a*) on the plasma solution and (*b*) again after addition of ferric chloride. The difference represents colour due to formation of the ferric-tannic complex, and assures that light absorption due to turbid sera is allowed for. Then a calibra-

TABLE V—BLOOD "TANNIC + GALLIC" ACID OF GOATS AFTER INTRAVENOUS INJECTION OF TANNIC ACID

Dose	Goat no:	After injection (mins.) mg./100 c.cm. plasma																								
		1			5			15			30			60			90			120			180			310		
		G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA
15 mg./kg. TA as 5% soln.	350	3	21·5	18·0	2	17	15	0	14·2	14·2	0	11·2	11·2	0	8	8	0	6·2	6·2	0	4	4	0	2·7	2·7	0	0·7	0·7
	351	3	18	15	1	14·2	13·2	0	11	11	0	8·5	8·5	0	7·2	7·2	0	4·5	4·5	0	3	3	0	2·0	2·0	0	0·5	0·5

		1			5			15			45			75			105			165			255			315		
20 mg./kg. TA as 5% soln.	354	2·5	20·7	18·2	3·0	27·0	24	3·5	20	16·5	0	16·5	16·5	0	12·5	12·5	0	9	9	0	5·5	5·5	0	2·7	2·7	0	2·2	2·2
	355	3·5	23·0	19·5	3·5	17	13·5	4	16	12	1·5	11	9·5	3·5	8	4·5	3	7	4	2·5	4	1·5	0	2	2	0	2	2

The gallic acid might well be accounted for by that present in the sample of tannic acid.
G = gallic acid. GT = gallic acid + tannic acid (ferric chloride estimation). TA = tannic acid.



Figs. 7 and 8—Blood changes in goats after subcutaneous injection of tannic acid (as 5% solution).

tion curve is constructed relating Spekker readings to tannic acid content.

The method is not specific for tannic acid for a number of other phenolic bodies react similarly, but we have not been able to demonstrate the presence of such bodies in the many normal animal sera examined by this technique.

The possibility of the absorption of tannic acid from burned areas after breakdown to gallic acid has been suggested by Prof. R. A. Peters. The ferric chloride method estimates gallic as well as tannic acid. It is therefore necessary to differentiate between gallic and tannic acid. This is a very difficult task, since all standard methods fail when applied to the minute traces which we find circulating in the blood-stream.

We have therefore devised a method based upon the oxidation of gallic acid in alkaline solution to a coloured quinonoid complex. Tannic acid does not react to anything like the same extent under the conditions of the test. Thus by performing the two estimations—(*a*) tannic and gallic acids by ferric chloride and (*b*) gallic acid by the oxidation method—tannic acid may be obtained by difference and the presence or absence of gallic acid demonstrated. We wish to emphasise, however, that too much stress should not be placed on the quantitative results of such gallic acid estimations since the compound errors of results obtained by difference are exaggerated.

The method for gallic acid consists in adding to the plasma an alkali, quickly followed by sodium hypochlorite. After a few minutes a greenish-brown colour develops. This colour is constant for some hours provided that the reagents are not added in excessive amounts. Again the quinonoid complex is precipitated unless maintained in solution with a protective colloid. Urea is also added to stabilise the complex. Much experimental work was necessary to establish the optimum conditions for this test; alternative alkalis—e.g., ammonia, triethanolamine, and other organic bases gave stable colorations but sodium carbonate gave the greatest degree of sensitivity and reproducibility.

The methods finally adopted are as follows:

TANNIC ACID (+ GALLIC ACID)

Solutions.—(1) 5% ferric chloride solution in water. (2) 0·4% gum ghatti solution in water. (Suspend 2 g. of gum in a wirebasket at the top of a cylinder filled to 500 ml. with distilled water. Allow to extract overnight and then filter.)

Method.—Samples of blood are collected from the jugular vein in the case of the goat and the ear in the case of the rabbit. Great care must be taken to see that there is no contamination of the sample with the large amounts of tannic acid which might be on the skin or fur of the animal; potassium oxalate prevents coagulation; citrate must not be used since this produces turbidity with the ferric chloride. The shed blood is centrifuged at a high speed; the clear plasma separated off, and 4 ml. of it are pipetted into a clean tube; 2 ml. of water and 1 ml. of gum ghatti solution are added. After mixing, the solution is read in the Spekker fitted with red screen no. 1. Then exactly 0·05 ml. of ferric chloride solution is added and the solution thoroughly mixed. After about 5 min. the colour is again measured in the Spekker and the reading difference referred to the calibration graph correlating Spekker reading to concentration of tannic (or gallic acid or both). It must be emphasised that Spekker cells should be thoroughly cleaned before use, to get rid of any protein film that may have formed in previous estimations. The method estimates quantities of tannic acid up to 1 mg. with an error of ± 5%.

GALLIC ACID

Solutions.—(1) 50% urea solution; (2) 25% sodium carbonate; (3) sodium hypochlorite (commercial strength).

Method.—Take 4 ml. of plasma, add 1 ml. of urea solution and 2 ml. of water. Read in the Spekker fitted with the red screen. Add 0·2 ml. of 25% sodium carbonate and 0·1 ml. of hypochlorite. Mix, stand for 10 min. and read again. Then the difference figure (corrected for dilution effect due to addition of reagents) is referred to the calibration curve prepared from known amounts of gallic acid added to plasma.

Absorption after injection.—When tannic acid is introduced directly into the circulation of goats, it

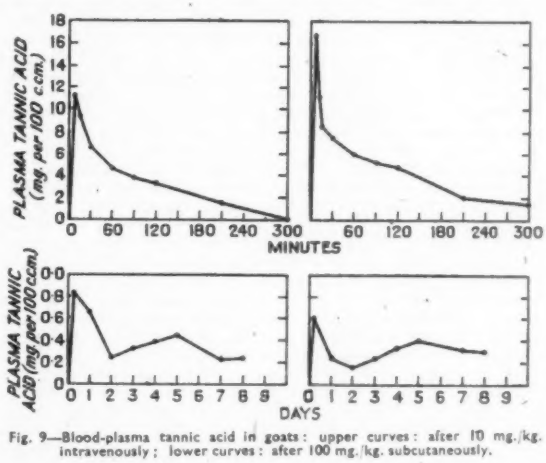


Fig. 9—Blood-plasma tannic acid in goats: upper curves: after 10 mg./kg. intravenously; lower curves: after 100 mg./kg. subcutaneously.

disappears after about 6 hours (tables IV and V, fig. 9 (*a*)). With subcutaneous administration, however, there is slow but continuous absorption over many days, no doubt due to precipitation of a certain amount of the tannic acid at the site of injection (table VI, fig. 9 (*b*)). Gallic acid, on the other hand, rapidly disappears from the blood after intravenous and subcutaneous injection (table VII). Moreover, very large amounts of gallic acid are tolerated by animals without damage to the liver.

We have carried out a few experiments on the excretion of these substances. Both gallic and tannic acid may appear in the bile within an hour; in the urine, however, it is mostly gallic acid which appears when tannic acid is administered.

Absorption from burnt surfaces.—It seems that slow absorption of tannic acid from subcutaneous tissues leads to a well-maintained, though low, blood-level of tannic acid for a number of days. Since a single dose of tannic acid given directly into the blood-stream is followed by its fairly rapid disappearance, it seems that continuous absorption is necessary to maintain a definite blood-level. Provided tannic acid can pass the surface barrier, the chances of keeping up such a blood-level might well be good with an often tanned burn. To test this possibility, we have carried out experiments in which skin areas of goats and rabbits were burned and treated by repeated spraying with 5% tannic acid. The burns were made under 'Nembutal' anæsthesia and involved about a twelfth of the total skin area in goats and an eighth in rabbits. The tannic acid content of the blood was followed for 6 days in goats and for 24 hours in rabbits (table VIII). Gallic acid was not detected after 4 hours' tanning, so the figures in this table may be regarded as true estimates of tannic acid in the plasma.

In the goat experiments, tannic acid was applied immediately after burning, as much of the dead epidermis as possible being scraped away first. This was difficult to do since the goat has a very tough hide and burning makes it even tougher. The tannic acid treatment was repeated daily for 3 days. Two of the goats showed tannic acid in their blood, one after 6 hours, the other at 24 hours. We were not able to follow the blood during the 6–24 hours interval. There may have been further positive results in that interval. None of these animals when killed after 6 days showed liver damage. It is possible that the two giving positive tannic acid tests may have shown changes in their livers in the early stages which cleared up by the 6th day.

The rabbit experiments were more successful, since it is comparatively easy to remove the burned skin and allow of efficient application of tannic acid. In these experiments, tannic acid was applied 5 times during the 7 hours following burning. Table VIII shows that each of 10 rabbits had definite amounts of tannic acid in the blood during the 24 hours after burning and tanning. When killed, many showed varying degrees of liver damage, although in no case was this as severe as after subcutaneous injection. Patches of liver-cell necrosis around the central veins were seen in rabbits 1010, 1012, 1014, and 1015; rabbit 971 showed much fat and commencing necrosis; rabbits 1011 and 1013 showed extensive fatty change but no necrosis; and rabbits, 972, 981 and 982 presented no liver abnormality (table VIII). Control animals with similar but untreated thermal burns have given no definite liver changes, beyond congestion of sinusoids around the centrolobular veins and some vacuolation and occasionally moderate fatty change.

We have also carried out some experiments with rats and obtained results very similar to those with rabbits.

There seems little doubt that even with not very extensive skin burns the application of tannic acid may be followed by its appearance and persistence in the blood and the development of slight or moderate liver damage. So far we have not had any fatal results, but this is most likely a question of extent of burn and amount of tannic acid applied. In none of our experiments has the blood level of tannic acid been high; the period of time over which tannic acid persists in the blood seems to be much more important in the production of injury.

The nature of the burn seems to play a part in determining whether absorption of tannic acid is likely. With severe burning and charring or heat-tanning of the skin, as in the goat, absorption takes place with difficulty. At a later stage, however, when the burn breaks down we have occasionally detected tannic acid in the blood. If burning is less severe and a raw surface is produced or if burnt tissue is completely removed and the exposed deeper tissues tanned, tannic acid seems to be absorbed without difficulty though in small amounts. In such cases, liver damage is likely to develop.

We conclude from these experiments that risks of tannic acid intoxication will arise when there is an extensive raw surface, or possibly exposed blood-vessels, and tanning is repeated in the early stages.

DISCUSSION

We have presented experimental evidence that in animals tannic acid has injurious effects upon the liver, capillaries and possibly upon the bone-marrow. After the introduction of small amounts of tannic acid directly into the blood-stream or large amounts into the subcutaneous tissues, animals show centrolobular necrosis in the liver, increased capillary permeability with leakage of plasma into the subcutaneous tissues, peritoneum, occasionally the lungs and possibly elsewhere, and leucocytosis. Production of a reservoir of tannic acid in the tissues, as by subcutaneous injection, leads to continued absorption of small amounts into the blood and a serious intoxication. Prof. W. C. Wilson (1942), we understand, has shown that the tannic acid protein complex in the circulating blood can exert injurious effects when introduced into normal animals. Tanning a burnt surface may also be followed by absorption of tannic acid, in small amounts it is true; with lapse of time the continual bathing of the liver cells with blood containing tannic acid results in damage and destruction of certain tissues. The injurious effect cannot be attributed to gallic acid, which is rapidly removed from the blood and can be tolerated in large amounts.

Other investigators have concluded that tannic acid is not without danger as a therapeutic agent. Much interest has been aroused by the paper of Wells, Humphrey and Coll (1942), who described prominent centrolobular liver necrosis in 4 cases of burns dying from toxæmia. Tannic acid baths were employed as part of the treatment. Subcutaneous injection of 5 or 10% solutions of tannic acid induced in rats some degree of liver damage which in general varied directly with the amount injected and the number of injection sites employed. All other organs examined appeared normal except for slight degeneration, cloudy swelling. The liver lesions included necrosis of the centrolobular cells, hæmorrhage and leucocytic infiltration in these areas, degenerative and nuclear changes in the peripheral zone of the liver lobules. We have heard, through private communication, of similar observations made by Professor Wilson. Erb, Morgan and Farmer (1943) have recently recorded the post-mortem findings in 61 fatal cases of burns, 41 of which were treated with tannic acid, the remaining 20 untanned.

Of the 41 tanned cases, 25 (61%) showed liver necrosis; 9 of these cases presented microscopic evidence of severe and extensive liver damage (++++), 5 moderately severe (+++), 8 fairly extensive (++) and in 3 the lesion was not prominent (+). The shortest survival time in which necrosis was found was 60 hours, the longest 19 days. One case died in 60 hours, 17 cases in 3–5 days, 7 in 6–19 days. Signs of hepatic regeneration were seen in 5 patients who died between the 8th and 19th days.

Of the 27 tanned cases dying between the 3rd and 19th days, only 3 failed to show liver necrosis. One of these was tanned 14 hours before death and in another the burned and tanned area had been excised on the 3rd day, the child dying of sepsis on the 14th day. No case of liver necrosis occurred in the untanned group, 7 of whom died in the 3–14 days period in which necrosis was an outstanding feature in the tanned group. Renal damage was observed in 19 cases, all but one of which belonged to the tanned group.

These workers adopt a commendably conservative attitude towards the use of tannic acid, pointing out the advantages which have followed its introduction and concluding that liver necrosis is not necessarily the cause of death, though it may be a serious complication.

Robinson and Graessle (1943) record experiments on the toxicity of tannic acid.

They state that it is toxic for mice and rats when administered intravenously or subcutaneously. In mice, for instance,

TABLE VI—BLOOD "TANNIC + GALLIC ACID" OF GOATS AND RABBITS AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID, AS 5% SOLUTION. Readings before injection were all negative

Dose mg./kg.	Animal	"Tannic + gallic acid" (mg./100 c.cm. plasma) after injection														
		hours						days								
		1	2	3	4	5	6	1	2	3	4	5	7	8	12	18
	Goat															
500	95	4·0	3·7	5·2	6·0	5·0	5·2	..	..	..	..	..	..	..	..	..
500	96	1·0	2·2	2·7	2·7	2·5	2·5	2·7	3·0	2·5	..	..	..	..	..	..
100	97	0·75	..	..	0·85	..	..	0·62	0·25	0·42	0·55	0·22	0·23	0·25	0·11	0·14
100	98	0·20	..	..	0·6	..	..	0·24	0·15	0·24	0·36	0·40	0·30	0·30	0·16	0·12
100	122	0·24	..	..	0·12	..	0·24	1·0	1·2	..	..	..	..	..	..	..
100	123	0·90	..	..	0·37	..	0·24	0·62	2·2	..	..	..	..	..	..	..
50	124	0·24	..	..	0	..	0·12	0·24	0·62	..	..	..	..	..	..	..
50	125	0·24	..	..	0	..	0·12	0·37	0·87	..	..	..	..	..	..	..
25	126	0·12	..	..	0	..	0·12	0·62	0·74	..	..	..	..	..	..	..
25	127	0·12	..	..	0·12	..	0·37	0·62	0·87	..	..	..	..	..	..	..
	Rabbit															
100	1061	1·4	..	..	0·72	..	0·62	1·4	..	..	..	..	..	..	..	..
100	1062	0·9	..	..	0	..	0·12	1·0	..	..	..	..	..	..	..	..
100	1063	1·6	..	..	0·62	..	0·37	0·12	..	..	..	..	..	..	..	..
100	1064	2·6	..	..	0·9	..	0·74	0·37	..	..	..	..	..	..	..	..

Dose mg./kg.		Hours after injection (mg./100 c.cm. plasma)																											
		½			1			2			4			6			24			48			72			96			120		
		G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA
300	Goat 352	0·6	1·5	0·9	1·6	2·5	0·9	0·7	2·0	1·3	0	1·5	1·5	0	1·0	1·0	0	1·7	1·7	0	2·2	2·2	0	4·2	4·2	0	4·2	4·2	0	3·5	3·5
	353	0	0	0	1·6	2	0·4	0	1·5	1·5	0	1·7	1·7	0	0·7	0·7	0	1·5	1·5	0	2	2	0	2·7	2·7	0	4·5	4·5	0	3·2	3·2

Dose mg./kg.		Hours after injection (mg./100 c.cm. plasma)																											
		½			1			2			4			6			24			48			72							
		G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA
100	Rabbit 1750	0	2·2	2·2	0	5	5	0	1·5	1·5	0	1·2	1·2	0	1·1	1·1	0	1·0	1·0	Died	..	..	..	..	..	..	..	..	..	..	..	..
	1751	0	0·9	0·9	0	1·8	1·8	0	2·2	2·2	0	1·2	1·2	0	0·66	0·66	0	1·0	1·0	0	1·0	1·0	0	0·6	0·6	..	..	..	..	..	..
	1752	0	0·85	0·85	0	2·5	2·5	Died	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1753	0	1·5	1·5	0	2·2	2·2	0	2·0	2·0	0	1·1	1·1	0	0·85	0·85	0	0·1	0·1	0	0·2	0·2	0	0·2	0·2	..	..	..	..	..	..

G = gallic acid. GT = gallic + tannic acid (ferric chloride method). TA = tannic acid.

TABLE VII—BLOOD GALLIC ACID IN GOATS AND RABBITS AFTER INTRAVENOUS (IV) AND SUBCUTANEOUS (S) INJECTION OF GALLIC ACID, AS 3% SOLUTION

Readings before injection were all negative

Dose mg./kg.	Animal	Gallic acid (mg./100 ml. plasma) after injection										
		mins.				hours						
		1	5	15	30	1	2	3	4	5	6	24
	Goat											
10 IV	232	9·5	5·0	1·0	0	0	..	..	..	..	..	..
10 IV	233	10·0	4·5	1·5	0	0	..	..	..	..	..	..
100 S	234	..	..	1·0	3·0	6·0	7·5	3·5	1·5	0·5	0	0
100 S	235	..	..	1·0	5·5	7·3	5·0	2·7	1·3	0·5	0	0
	Rabbit											
100 S	1123	..	..	5·0	..	10·0	3·7	..	0·5	..	0	..
100 S	1124	..	..	5·0	..	8·1	2·5	..	0·5	..	0	..
100 S	1125	..	..	6·0	..	8·0	3·0	..	0·2	..	0	..
100 S	1126	..	..	2·7	..	11·0	7·5	..	6·5	..	5·0	K

K = killed.

the oral fatal dose lies between 3 and 4 g. per kg. body-weight; in contrast 60 mg. per kg. intravenously killed 18 of 20 mice; 40 mg. per kg. killed 7 out of 20. The minimal lethal dose for subcutaneous injection is between 125 and 150 mg. per kg. When applied to the deep subcutaneous tissue following surgical removal of the skin, tannic acid is lethal to mice but not to rats or rabbits. Liver damage shown by increased retention of bromsulphalein resulted in rabbits from subcutaneous administration of tannic acid, but not when it was applied to denuded surfaces. Water diuresis in rats was depressed after intraperitoneal injection, not with subcutaneous injection of large doses or the application of tannic acid to denuded skin surfaces. These workers note that none of the toxic signs produced by tannic acid are seen after large doses of gallic acid.

Rossiter and Barnes (1943) have demonstrated the toxicity of tannic acid and sodium tannate in mice and guineapigs after intravenous and subcutaneous injection. Liver degeneration or necrosis was the outstanding pathological finding in their animals. Forbes and Evans (1943) also have studied the "hepatotoxic effect" of tannic acid, while Hirshfeld, Pilling and Maun (1943) have lately described the local tissue damage caused in forming an eschar.

It seems that all may not be well with the tannic acid treatment of burns. At present the chief criticism comes from the experimentalist and caution must be exercised in applying to man, without discrimination, conclusions reached by the study of animals. Our own investigation is offered as a contribution, in the first instance, to toxicology, though we have tried to design experiments

TABLE VIII—BLOOD "GALLIC + TANNIC ACID" AFTER TANNING THERMAL BURNS INVOLVING A TWELFTH OF THE TOTAL BODY SURFACE OF GOATS AND AN EIGHTH OF RABBITS

Readings before tanning were all negative

Animal	"Gallic + tannic acid" (mg./100 ml. plasma) after tanning								
	hours			days					
	2	4	6	1	2	3	4	5	6
Goat									
102	..	0	2·0	0	0	0	0	0	0
103	..	0	0	0	0	0	0	0	0
118	..	0	0	0·5	0	0	0	0	0
119	..	0	0	0	0	0	0	0	0
Rabbit									
971	..	0	..	0·5	..	..	..	..	..
972	..	1·0	..	1·1	..	..	..	..	..
981	1·0	0·2	..	0	..	..	..	..	..
982	1·0	0·7	..	0	..	..	..	..	..
1010	2·7	1·7	1·6	0	..	..	..	..	..
1011	1·9	1·6	1·6	0·9	..	..	..	..	..
1012	1·0	0·6	1·2	1·0	..	..	..	..	..
1013	0·9	0·6	2·2	1·0	..	..	..	..	..
1014	1·6	1·4	1·0	1·6	..	..	..	..	..
1015	4·6	1·2	1·9	1·1	..	..	..	..	..

Goats tanned immediately after burning and at daily intervals for 3 days.
Rabbits tanned 5 times during the first 7 hours after burning.

which have some bearing on the practical treatment of burns. We recognise that the ultimate decision for or against the tannic acid method must come from human experience, and we note with some dismay that evidence is already accumulating which suggests the need for critical revision of this treatment.

SUMMARY

When tannic acid is administered subcutaneously or intravenously to animals it persists in the blood for some time, inducing hæmoconcentration, loss of plasma proteins, leucocytosis and severe liver damage. These effects are not due to gallic acid.

The application of tannic acid to large burnt skin surfaces of animals may be followed by its absorption and subsequent liver injury.

Our thanks are due to the Director-General, Scientific Research and Development, Ministry of Supply, for permission to carry out and publish this investigation. We also wish to thank Prof. R. A. Peters, FRS, Dr. F. C. Courtice, and Messrs. F. Burgess and J. P. Rutland for valuable assistance; and we are grateful to Surgeon Captain A. Fairley, RN, who provided us with facilities for our work. The Director-General, Army Medical Services, has kindly allowed us to refer to the unpublished reports by Lieut.-Colonel W. C. Wilson, RAMC.

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FORMATION OF RED BLOOD CORPUSCLES

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(*Illustrations on Plate*)

SINCE writing my previous article[1] I have made further investigations into blood development, and it now seems to me that the blood is made up in two different ways by an intra-uterine process and an extra-uterine process.

INTRA-UTERINE PROCESS

In the fœtus the mononuclear cell which has been described as the nucleated red corpuscle is not regular in size or shape and the cells have irregular protoplasm. In some of the cells the protoplasm is the size of two or three red corpuscles. From the protoplasm of these various cells are extruded the globules of hæmoglobin which are the anucleated red corpuscles. In figs. 1 and 2 (see plate) it can be seen that there are different types of nucleated red corpuscles, each having different irregularities in the protoplasm, and in fig. 2 *d* I have been lucky enough to photograph a cell which is extruding an anucleated red blood corpuscle. Under the microscope it can be seen that the protoplasmic remnant with the nucleus has the same pink colour as the anucleated red blood corpuscles.

I think this intra-uterine cycle of blood formation is a minor one, in which the protoplasm of the mononuclear cell grows and eventually extrudes some protoplasmic portion which becomes the anucleated red blood corpuscle. After an unknown number of cycles have been completed it seems that the nucleated remnant may become a lymphocyte, because the body needs to build up a large store of lymphocytes. We shall see later how this becomes important in extra-uterine blood-formation.

Possibly the extra-uterine mammal is also able to secrete red corpuscles on a small scale in the bone-marrow, by the same process as the intra-uterine formation, and this process becomes more active in some diseases, with hypertrophy of the marrow.

EXTRA-UTERINE PROCESS

In my first article I mentioned that the eosinophil played an important part in blood formation; but I was only able to allow it a symbiotic part in the cycle because I had no evidence to the contrary. Recently, however, I came across a rare case of a sarcoma of the stomach (fig. 8) which will be described elsewhere. Studying a slide made from this tumour, under low-power, I saw a large quantity of free blood. It is well known that some of the blood in the sarcomas is not contained within capillary walls. By investigating this slide carefully under oil-immersion I was surprised to find that the area of free blood contained a large number of granules of different sizes which were grouped together in different accumulations but all having the same affinity for eosin. The size of these granules varied from the size of those contained in the eosinophil polymorph to the fully developed and typical red blood corpuscle (fig. 5). There were also many cells of different sizes each containing a different number of granules in various stages of evolution (fig. 3). I could see clearly cells which had burst and expelled the red blood corpuscles, the remaining nucleus of the cell becoming a lymphocyte (fig. 6, *a* and *b*).

This discovery of the evolution of the red corpuscles from the granules of the eosinophil was so unexpected that I wanted more confirmation before I was prepared to accept it as a fact. But after careful observation of different tissues in which hæmopoiesis was evident, particularly in a carcinomatous lymphatic gland, I realised that there could be no doubt about it whatever.

The secretion of the red corpuscles can be observed more easily in pathological tissues than in normal hæmopoietic organs. There are two explanations for this: one is that in the hæmopoietic organs the very large number of cells present blur the microscopic picture and make detailed observation difficult; the other that the acid used for decalcification of bone-marrow produces a change in the cells, which, when stained, do not give a very clear or satisfactory microscopic picture. In a small aberrant spleen which I found at an autopsy I discovered it was easier to see the different cells secreting red blood corpuscles than it was in the

1. See *Lancet*, 1943, i, 513.

Legends to Illustrations

PROF. CAMERON, MR. MILTON, MR. ALLEN

FIG. 1—Liver 24 hours after subcutaneous injection of 1000 mg./kg. tannic acid (guineapig 37). Extensive centrolobular necrosis. Hæmatoxylin and eosin. (× 35.)

FIG. 2—Liver 3 days after subcutaneous injection of 500 mg./kg. tannic acid (goat 16). Massive necrosis with small islands of persisting normal tissue at periphery of lobules. Hæmatoxylin and eosin. (× 35.)

FIG. 3—Liver 4 days after subcutaneous injection of 500 mg./kg. tannic acid (goat 13). Massive centrolobular necrosis. Regeneration beginning in peripheral surviving tissue. Hæmotoxylin and eosin. (× 35.)

FIG. 4—Liver 6 days after subcutaneous injection of 1000 mg./kg. tannic acid (guineapig 13). Shrinking centrolobular necrosis with regeneration. Much fatty change in normal liver tissue. Hæmatoxylin and eosin. (× 35.)

FIG. 5—Liver 6 days after subcutaneous injection of 500 mg./kg. tannic acid. Well advanced liver-cell regeneration with shrunken areas of necrosis (guineapig 8). Hæmatoxylin and eosin. (× 35.)

FIG. 6—Liver 8 days after subcutaneous injection of 500 mg./kg. tannic acid. Regeneration almost complete. Hæmatoxylin and eosin. (× 35.)

DR. DURAN-JORDA

FIGS. 1 and 2—Intra-uterine red corpuscle formation (from a 2·5 mm. human embryo): 1 (*a*) and (*b*) nuclear and protoplasmic remnants after red corpuscle formation; (*c*) and (*d*) nucleated red corpuscle (extravascular). 2 (*a*), (*b*) and (*c*) intravascular red corpuscles of different sizes; (*d*) extruded anucleated red corpuscle (extravascular).

FIG. 3—Gastric sarcoma showing intracellular blood formation. Eosinophil cells in different stages of evolution.

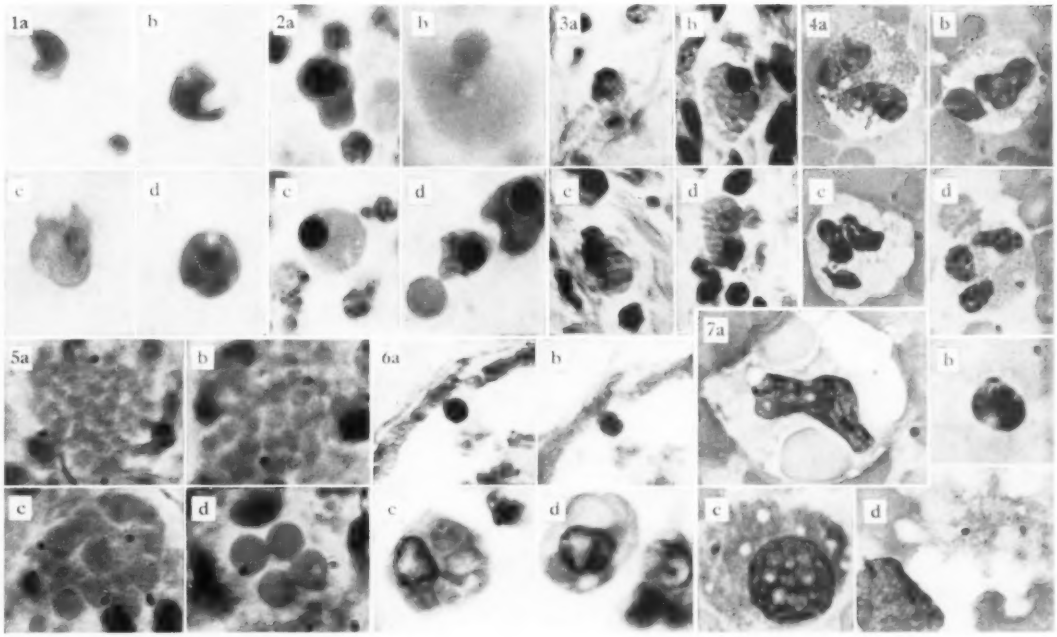
FIG. 4—Angioma. (*a*), (*b*) and (*c*) different stages of the eosinophil polymorph; (*d*) control picture of eosinophil in the peripheral blood of the same patient.

FIG. 5—Gastric sarcoma. Evolution of red corpuscle from the granules of the eosinophil.

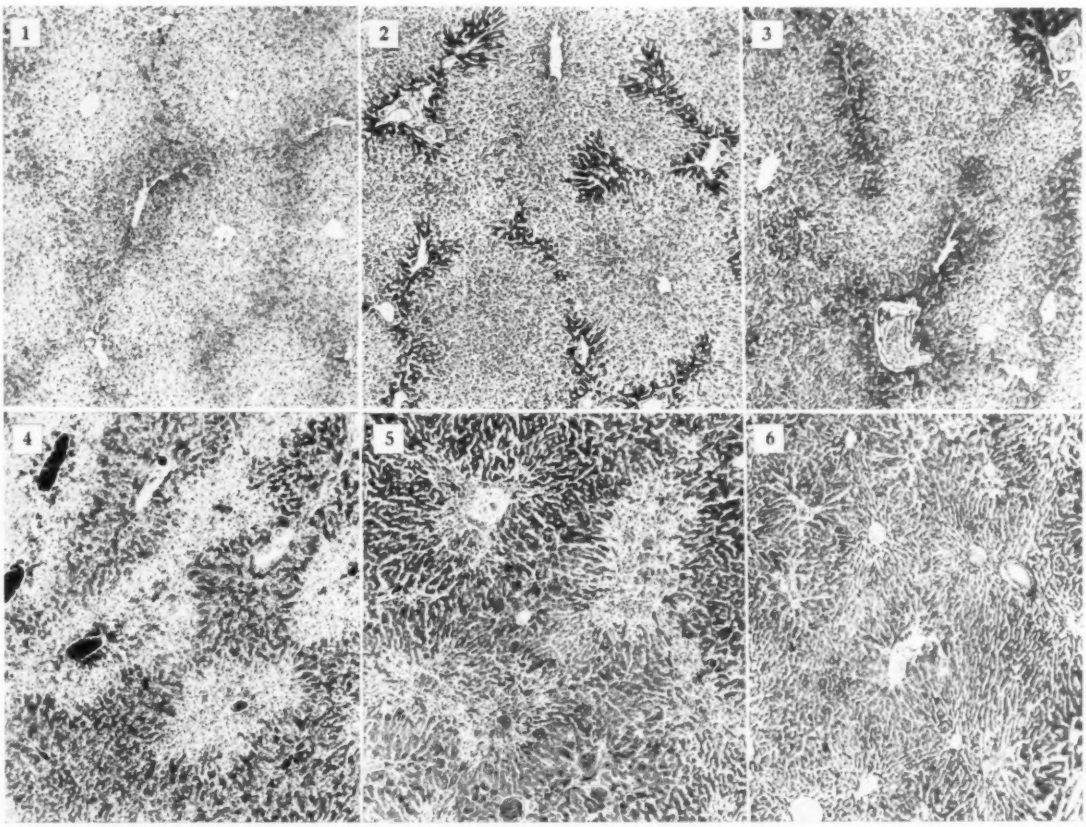
FIG. 6—(*a*) and (*b*) gastric sarcoma; nucleated remnant as lymphocyte. (Both pictures taken from same field under different microscopical focus.) (*c*) and (*d*) Aberrant spleen; cells forming blood. (Similar pictures have been regarded as showing phagocytosis of red cells.)

FIG. 7—Angioma. (*a*) Nucleus of a transitional cell; (*b*) giant platelet; (*c*) Türck cell containing eosinophilic granules; (*d*) mononuclear cell with empty vacuoles inside; protoplasm resembles an accumulation of platelets in places.

DR. DURAN-JORDA: FORMATION OF RED BLOOD CORPUSCLES

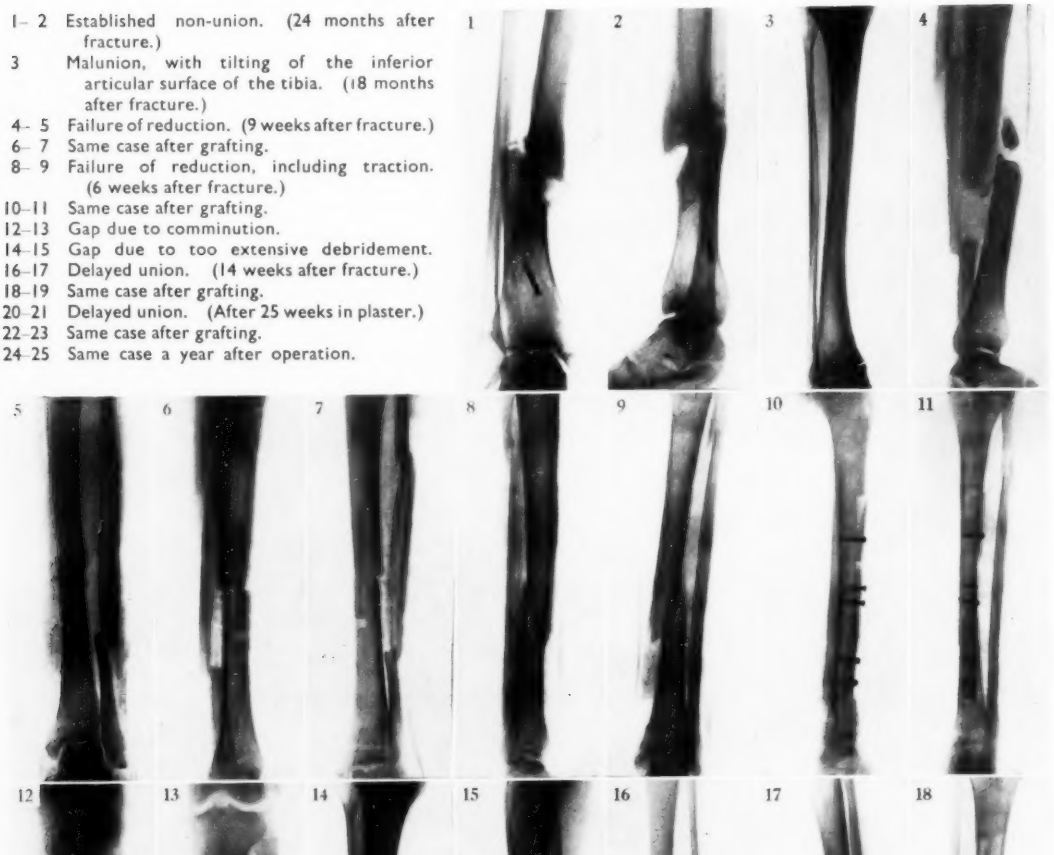


PROF. CAMERON, MR. MILTON, MR. ALLEN: TOXICITY OF TANNIC ACID



WING-COMMANDER ARMSTRONG: BONE-GRAFTING

1–2 Established non-union. (24 months after fracture.)
3 Malunion, with tilting of the inferior articular surface of the tibia. (18 months after fracture.)
4–5 Failure of reduction. (9 weeks after fracture.)
6–7 Same case after grafting.
8–9 Failure of reduction, including traction. (6 weeks after fracture.)
10–11 Same case after grafting.
12–13 Gap due to comminution.
14–15 Gap due to too extensive debridement.
16–17 Delayed union. (14 weeks after fracture.)
18–19 Same case after grafting.
20–21 Delayed union. (After 25 weeks in plaster.)
22–23 Same case after grafting.
24–25 Same case a year after operation.



spleen of the same patient (fig. 6, *c* and *d*). Blood-forming cells can be seen in rabbit spleens by obtaining a little of the pulp from the spleen and diluting it with formal-saline, afterwards making a wet film for observation under high magnification.

Since there are blood-tumours which are not connected with the general circulation, classified as angiomas, I thought that possibly a study of them would help me to confirm the discovery made in this gastric sarcoma. I studied the blood of a large angioma of the calf of the leg, after extirpation, by making a puncture of a vascular dilatation of a bluish colour, and by staining some of the smears obtained with May-Grunwald-Giemsa. The blood differs strikingly in colour and thickness from capillary blood obtained from the surface of the tumour after resection. The differential count obtained from the blood tumour was as follows: polymorph eosinophils 12%; polymorph basophils 3%; lymphocytes 54%; mononuclears 31%. There was a total absence of nucleated red corpuscles from any group, either normoblast or megaloblast. The pictures of the angioma, (figs. 4 and 7) give a good idea of the extensive damage produced in the cells by the spreading of the smear. The same damage occurs in smears obtained from routine sternal puncture.

The differential count of the tumour blood, which does not contain any neutrophil polymorphs, is in striking contrast to the differential count of the patient's peripheral blood: neutrophil polymorphs 53%; lymphocytes 34%; mononuclears 13%. The eosinophil polymorphs in the blood of the tumour showed clearly how the eosinophil granules swell; but some of the cells had lost a large number of eosinophil granules owing to the destruction produced by the smear, and only a few remained in the protoplasm. Other cells were without granules at all, but it was possible to see the shape of the granules in the protoplasm where they had been before they were destroyed by smearing (fig. 4, *a*, *b* and *c*).

Some of the mononuclear cells still contained the full-size red corpuscles and others contained some swollen eosinophil granules, but a large number of the cells had empty vacuoles in the protoplasm where the red corpuscles had been present before they had been damaged by the smear. The nuclei of these mononuclear cells were of different shapes and sizes, varying from the nucleus of a transitional cell (fig. 7, *a*) to that of a typical mononuclear (fig. 7 *d*). It was also possible to see clearly another cell which could be classified as a Türck cell with a few eosinophil granules inside (fig. 7 *c*). The differing characteristics of the cells and their nuclei can be attributed to the fact that puncture of the tumour disturbed cell development, and the cells are seen in intermediate stages of their evolution. This is borne out by the presence of eosinophil granules which have not developed into full-size red corpuscles. The final stage in this hæmopoïesis is the evolution of the nucleus as a lymphocyte; and lymphocytes formed 54% of the total white cells of the tumour. This process can be seen by studying hæmopoiesis in different tissues. Portions of the protoplasm of the mononuclear cells have the same colour and structure as the platelets, fig. 7 *d*, and there were some bodies present of the same size as the red corpuscles which could easily be taken for giant platelets (fig. 7 *b*).

A complete study of the blood from this angioma and of the sarcoma of the stomach gave me concrete evidence that from the granules of the eosinophil come the fully developed red corpuscles; and the different kinds of remaining nuclei from the cells help to maintain the monophyletic theory of blood-cell formation, which until now did not include the formation of the red corpuscles.

ORIGIN OF THE EOSINOPHILS

The question then arose, "whence do the eosinophils originate?" The accepted theories of eosinophil formation are unconvincing in the light of these observations. During routine examinations of bone-marrows I found that between the myeloblast and the eosinophil myelocyte a stage is missing where the number of protoplasmatic eosinophil granules in the cell should be gradually increasing. Instead, the myelocytes are always full of eosinophil granules, some of them being coarser than the granules of the eosinophil polymorphs present in the same bone-marrow. It has also been observed that in eosinophilic leukæmias most of the eosinophils in the peripheral blood as well as in the bone-marrow are polymorphonuclear and that myelocytes are extremely few.

I discounted the current theory of eosinophil polymorph formation from the myeloblast through the eosinophil myelocyte in the bone-marrow, and began to study instead the possibility of its being formed by the evolution to eosinophil granules of the neutrophil granules found in the ordinary polymorphs. When stained with Leishmann or May-Grunwald-Giemsa, some blood films show neutrophilic granules difficult to classify as such, because it is hard to distinguish them from eosinophilic granules. To differentiate the granules of the eosinophils more clearly I stained the peripheral blood and bone-marrow films with a simpler stain (hæmatoxylin and eosin). This has the advantage of not staining any granules other than the eosinophil granules.

I was careful not to overstain the sections and blood-slides with eosin since this makes the supporting tissue very red and blurs the slide. The method differs from the classic staining method in that diluted eosin is applied for 20–30 min., instead of a saturated alcoholic solution applied for 1–2 min. Using a 5% aqueous solution as stock I make 0·5% by mixing 10 c.cm. of this stock with 65% distilled water and 25% absolute alcohol; this 0·5% alcoholic solution of eosin is used as a counter-stain. The method leaves the supporting tissue less red, so that the blood-forming cells are not camouflaged.

I was readily satisfied that the neutrophil polymorph in the peripheral blood and bone-marrow is not connected in any way with the eosinophil group. It then became necessary to analyse other organs to find the origin of the eosinophil cells. The spleen was immediately ruled out by the fact that splenectomy is followed by an important temporary rise of these cells in the blood. Other organs, such as the pituitary, which show cells with eosinophilic affinity, were also ruled out because the eosinophil cells had no possible connexion with the eosinophil leucocytes.

There is a group of organs in the body, however, where eosinophil cells are normally present in large numbers, and also in some pathological conditions. The presence of these cells is not mentioned in the histological and physiological textbooks, but the organs which contain them are the stomach and intestines; moreover these organs, as is well known, show large patches of lymphocytes, some of which have been specially described as Peyer's patches.

In the gastric mucosa, the number of eosinophil cells present in a section of 5 microns is approximately 5 cells per gland tubule [2]; and as there are about 35 million glands in the gastric mucosa it can be estimated that there are at least 175 million eosinophil cells in this organ alone. The same, more or less, applies to the intestinal mucosa. In the deepest parts of these mucosas it is simple to follow the evolution from mononuclear cells of the lymphatic tissue which are free of eosinophil granules to mononuclar cells which have a large number of granules inside. It is also possible to see in these mucosas a nuclear karyokinesis which transforms the rod-shaped nucleus of the mononuclear cell into that of a polymorph.

In the intestinal mucosa the lymphocyte becomes fixed and makes up eosinophil granules, the cell at this stage having the appearance of what is known as the Paneth cell; this eventually shrinks until it becomes the size of a fully developed eosinophil polymorph which is then ready to wander in the tissues and pass through the wall of a lymphatic or capillary vessel; nature gives the polymorphs their nuclear shape because the diameter of the lobules is much smaller than the nuclear diameter of any mononuclear cell.

When the eosinophil polymorphs, with lobulated nuclei, have developed from the lymphocytes they enter the circulation and drift towards the hæmopoietic organs or to any tissues suffering from pathological processes. In these sites they secrete the red corpuscles, and the remaining protoplasmic nuclei become lymphocytes

2. All microscopical studies are done in two dimensions only—length and breadth. This estimation of approximately 5 cells per gland means that these are the cells seen in a section of 5 microns; accepting the gland as a cone the number of cells should be larger.

again, as the studies of the blood of the angioma and sarcoma showed.

This hæmopoiesis is always seen in the presence of plasma cells and eosinophils. For this reason, not knowing that the red corpuscles were evolved from the eosinophils, I took the plasma cell to be the parent of the red corpuscles. Now that I am in possession of different facts I conclude that those plasma cells which have eosinophilic granules in the protoplasm are the equivalent of the eosinophil myelocyte in the spleen and bone-marrow. As yet, however, I cannot say whether the plasma cells without eosinophil granules are the nucleated protoplasmic remnants passing through an intermediate stage after forming red corpuscles, or whether they have another function.

Until now blood has been studied as a static tissue, and the differential count interpreted as a permanent picture of a fixed proportion of cells contained in the circulating blood. Because of this, some may ask how is it possible to explain the full development of the red corpuscles from the eosinophil cells when the eosinophils are normally present in the peripheral blood as only 2% of the white corpuscles? I can only point out that the same applies to the chemical components of the blood, and if these were also accepted as being in a static state it would be impossible to understand where the 2000 calories come from which the body needs daily when there is such a small quantity of proteins, fat and glucose in pheripheral blood. These chemical products must be in a dynamic metabolism; if we accept the blood-cells as also being dynamic, then knowing that the blood circulates all over the body in less than a minute, it is easy to understand how the circulation, with 7000 white cells per c.mm. and 2% eosinophils can carry, theoretically, during one day, about 200,000 eosinophils per c.mm. Fig. 9 shows how the cells are constantly changing in the same patient over a period of 17 hours. Every eosinophil contains more than 60 granules, and if all these developed every day, the result would be the daily production of about 12 million red corpuscles per c.mm.; the eosinophil cell could be responsible for the formation of all red corpuscles.

SUMMARY

The lymphocytes in the gastric and intestinal mucosas, by karyokinesis of the nucleus become fully developed eosinophil cells after an intermediate stage as Paneth cells. The fully developed eosinophils wander to the blood-stream and to the haemopoietic organs, carrying the preformed red corpuscles. In the hæmopoietic organs they develop their complete function of secreting the red corpuscles, expelling the protoplasmic remnants which are the platelets; the remaining nucleus becomes a lymphocyte again. The lymphocytes probably then return from the hæmopoietic organs to the gastric and intestinal mucosas, so completing the extra-uterine cycle of red corpuscle formation.

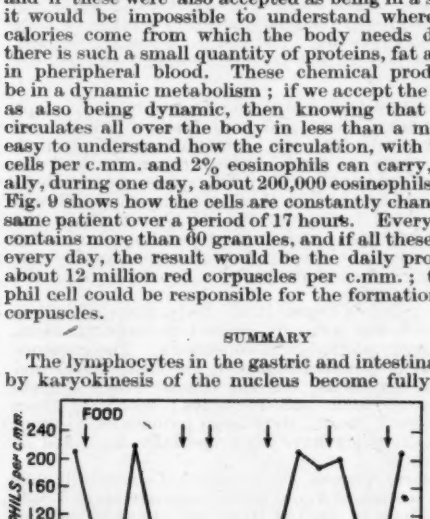


Fig. 9—Eosinophil counts in a single subject over 17 hours.

CONCLUSIONS

There are two processes of blood formation, here described as intra-uterine and extra-uterine.

The eosinophil polymorph is the carrier of preformed red corpuscles from the gastric and intestinal mucosas to the hæmopoietic organs in normal conditions, or to other tissues and organs in pathological conditions.

The lymphocyte, through the intermediate stage of Paneth cell, becomes an eosinophil cell in the gastric and intestinal mucosas.

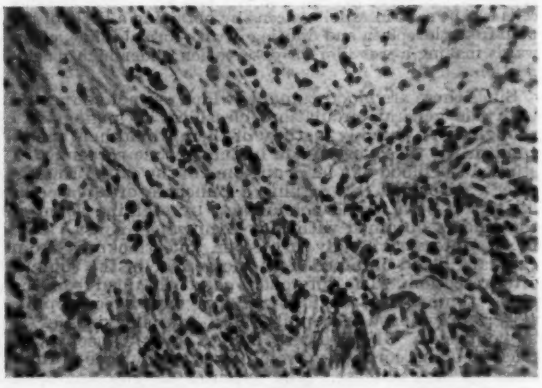


Fig. 8—Gastric sarcoma, showing hæmopoiesis.

The granules of the eosinophil cell are preformed red corpuscles.

After bursting and extruding the red corpuscles the mononuclear remainder of the eosinophil cell becomes a lymphocyte.

The eosinophil myelocyte of the bone-marrow is not a predecessor of the eosinophil polymorph, but is a successor.

The gastric and intestinal mucosas are the organs where the blood is formed.

I would like to thank Prof. F. Wood Jones for his kind criticism and discussions; Mr. J. B. Dean, BSC, who has done all the photomicrographs in connexion with this work; my technician, Mr. Butcher, for his help with histological work; and my secretary.

BONE-GRAFTING

IN THE TREATMENT OF FRACTURED TIBIA AND FIBULA

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(*Illustrations on Plate*)

FRACTURES of the shafts of the tibia and fibula are comparatively common injuries, with certain characteristic features. These features include a tendency to re-displacement after an initial accurate reduction, frequent slow union leading to non-union if unrecognised, and disability, often serious, if the fractures are allowed to unite in imperfect alignment or with rotational displacement (Watson-Jones 1940). For these reasons it is not surprising that the results of treatment are often imperfect, especially as there appears to be a tendency to regard these fractures as relatively simple injuries. Treatment by open operation is, however, only rarely necessary, particularly if adequate conservative methods are employed from the outset. It must be emphasised that, heavy though the penalty of failure of conservative treatment may be, the result of failure of operative treatment may well be tragedy.

INDICATIONS FOR OPEN OPERATION

There are four *absolute indications* and two *relative indications* for operation. The absolute indications are:

1. *Established non-union.*—When the fractured surfaces have become sealed off by a layer of dense sclerosed bone no form of conservative treatment will result in bony union. Figs. 1 and 2 (on plate) show a 24-months-old fracture which had been treated in plaster for 12 months, followed by drilling the bone ends and plaster for a further 6 months. Removal of the plaster was followed by increasing pain and disability, and the radiograms show an ununited fracture with sclerosis of the bone ends. The drill fragment is a legacy from the previous operation elsewhere.

2. *Malunion sufficient to cause serious disability.*—In such cases disability can only be relieved by division of

the bone and correction of the deformity. Fig. 3 shows a fracture 18 months old which has resulted in gross tilting of the inferior articular surface of the tibia. Osteotomy and correction of this tilting much improved the function of the leg.

3. *Failure to obtain adequate reduction by conservative methods.*—Recent fractures can almost always be accurately reduced by a combination of manipulation and traction, the procedure being much facilitated by the use of a Zimmer or Watson-Jones traction apparatus. Reduction becomes increasingly difficult later, and, if more than a month has elapsed since injury, may be impossible using conservative methods only. Figs. 4 and 5 show a 9-weeks-old fracture, which had been treated by immobilisation in back and side splints for 7 weeks, followed by application of plaster-of-paris. It is unlikely that the degree of overlap present could be corrected by traction alone, but by operative reduction and grafting normal apposition and alignment can be secured (figs. 6 and 7). Occasionally accurate reduction is prevented by interposition of soft tissue between the bone ends. Figs. 8 and 9 show an oblique fracture 6 weeks old, after treatment by manipulation and plaster, followed by traction on a Braun's splint with a pin through the os calcis and later a further manipulation and plaster. At operation the upper end of the lower fragment was found to have penetrated the periosteum, and the bone ends were separated by a periosteal flap which had to be divided before reduction could be obtained.

4. *Loss of bone sufficient to prevent union or to delay it unduly.*—This is most commonly seen in fractures caused by a missile travelling at a high velocity, and after a too enthusiastic debridement of a compound fracture. Occasionally a simple fracture of the tibia is associated with much comminution of the bone ends, and displacement of some fragments leaves a considerable gap to be bridged by callus (figs. 12 and 13). Figs. 14 and 15 show a 7-months-old compound fracture treated by excision and debridement of the wound. The resulting gap has only been crossed by a slender bridge of bone, insufficiently strong for weight-bearing.

The two relative indications for operation are:

1. *Delayed union in certain circumstances.*—In some fractures union may be long delayed. Interference with blood-supply, inadequate immobilisation, and distraction are only three of the possible causes of such delay. In some of these fractures it may be justifiable to hasten union by bone-grafting. Figs. 16 and 17 show a 14-weeks-old fracture in which only about half the bone ends are in apposition, although the fragments are in satisfactory alignment. There was no clinical evidence of union, and no callus formation is seen in the radiograms. Figs. 20 and 21 show a 31-weeks-old fracture treated in plaster for 25 weeks. Removal of plaster was followed by symptoms and the radiograms show that the fracture is not soundly united. Both these fractures were treated by bone-grafting.

2. *Grossly unstable fractures.*—In certain types of fracture, notably very oblique fractures with a loose "butterfly" fragment, it may be impossible to maintain accurate reduction by conservative methods alone. Such fractures can be adequately immobilised by a combination of internal and external fixation.

There are two *contra-indications* to operation. The first is local infection in the affected limb, either of skin, bone, or other tissues, or an active septic focus elsewhere in the body; fractures in which there has been an infection of bone should be approached with special care, remembering how often an apparently subsided focus will "flare" after an operation. The second is any doubt at all of the absolute efficacy of the theatre technique available. Unless the aseptic technique is completely reliable, operation is unjustifiable.

AIMS AND METHODS OF BONE-GRAFTING

Three essential results should follow an ideal operation:

Restoration of the normal relationship between the bony fragments.

Mechanically stable fixation of the fragments in normal relationship.

The establishment of conditions most favourable for subsequent union by bone.

Many types of operation fall short of these requirements. Simple reduction after "freshening" or drilling bone ends is not mechanically stable and displacement may recur. Reduction and fixation with screws or plates of 'Vitallium' or other material does not produce conditions as favourable for union as is the case with procedures using autogenous bone-grafts. Using autogenous grafts it is difficult to produce stable fixation by relying only on accurate fitting of the graft. The introduction of non-ionisable metals such as vitallium has made it possible to combine the best features of these procedures by using massive grafts of autogenous bone fixed by screws. In this way a very stable fixation is produced, there is no danger of the screws working loose due to bone absorption, or adversely affecting the process of bony union, and no fear of subsequent ill effects due to the presence of an ionisable metal in the tissues.

The tibia, easily accessible and roughly triangular in section, with flattened anteromedial, anterolateral and posterior surfaces, would appear to be an ideal medium for any of the various grafting techniques. In practice, however, several difficulties arise, and it is not easy to devise a technique which is simple, applicable to all types of fractures, and requires a minimum of instruments and dexterity on the part of the surgeon.

Inlay grafts.—One of the most commonly practised methods is the use of an inlay graft on the readily accessible anteromedial surface of the bone. It is extremely difficult to make an inlay graft fit its bed so snugly that the cortical element of the graft coincides exactly with the cortex of the tibia (fig. 26 *a*). Unless the graft fits so closely that considerable difficulty is experienced in "springing" it into its bed it tends to sink into the medullary cavity of the tibia, especially when the retaining screws are being driven home (fig. 26 *b*). "Springing" a closely fitting graft into its bed is not without its difficulties. Grafts have been broken and bones split during this manœuvre. An ideal inlay graft should be cut with a bevelled edge (fig. 26 *c*). This precludes the use of a double saw, and makes it much more difficult to cut the graft to the exact width required. In practice many inlay grafts are, in fact, intramedullary, and, while excellent results are often seen, non-union is more frequent with intramedullary than with other types of autogenous grafts (Campbell 1939a). Moreover, a much more extensive process of repair is necessary to restore the bone to normal than when the graft is so placed that the structure of the bone approximates to normal at the end of operation.

Fig. 26—A bevelled edge prevents the inlay graft from sinking into the medulla.

A second difficulty arises in connexion with the alignment of the tibial fragments. The anteromedial surface of the tibia is not flat but curved, the degree of curve varying from individual to individual and being greatest at the junction of the upper and middle, and middle and lower thirds (fig. 27 *a*). These points are common sites of fracture, and if a sliding graft cut from the middle third is used, and so placed that the cortex of the graft accurately coincides with the cortex of the tibia, the curve of the graft is not sufficient to reproduce the normal curve of the bone and malalignment with tilting of the inferior joint surface is produced (fig. 27 *b*). In such circumstances one or other end of the graft must be sunk into the medullary cavity if normal alignment of the bone as a whole is to be maintained (fig 27 *c* and *d*). It is not easy to estimate the exact amount of countersinking necessary to produce normal alignment, and this difficulty can be overcome by cutting the graft from an area on the opposite tibia exactly corresponding to the graft bed. Then, provided both tibiæ are similarly curved, when the graft is transposed its shape is such that when the cortical surfaces of graft and tibia coincide normal alignment of the fragments is reproduced (fig. 28).

A third objection to this method is the limited strength

of the graft. Even if the very largest possible graft is used and fixed with screws, where the graft crosses the fracture line is always a weak area in the reconstructed bone. Even moderate violence would fracture the graft at this point, and absorption of a graft, insufficiently protected by external fixation, in the line of the original fracture is by no means unknown.

Onlay grafts.—A massive sliding onlay graft consisting of the whole anteromedial surface of the tibia may be used. This method is open to the objection discussed in connexion with sliding inlay grafts—the curve of the graft is often insufficient to produce normal alignment of the tibial fragments. An onlay graft cut from the sound tibia and placed far back on the anterolateral surface of the tibia has been advocated by Campbell (1939b). To have the required curve such a graft should be cut from an area on the sound tibia exactly corresponding to the graft bed, not an easily accessible place from which to cut a graft.

Massive sliding graft: the "split-bone" technique.—I have found the use of a massive sliding graft consisting of half the tibia, on the principle described by Gill (1932) in connexion with the radius and ulna, an improvement on either of the previous methods. The tibia is exposed subperiosteally along its whole length, the fracture is reduced and held so that the fragments are in normal relationship, and the bone is split in two along about half its length in such a way that two-thirds of the divided area is on the longer, and one-third on the shorter, fragment. The bone is divided approximately at its centre and the anterior fragments removed (fig. 29). The longer fragment is laid across the fracture and fixed in position with vitallium screws, and the gap left is filled with the shorter fragment (fig. 30).

The advantages of this technique are as follows:—

1. A very massive graft, producing a mechanically stable fixation, is used.

2. Any sclerosed areas of bone around the fractured surfaces are widely opened up.

3. Large areas of raw bone on the graft and host are brought into close and stable contact, producing conditions favourable for rapid revascularisation of the graft.

4. It is very easy to correct any tendency to malalignment, particularly the medial or lateral bowing which often causes difficulties when other methods are used.

5. The shape and structure of the reconstructed bone approximates to normal, reducing to a minimum the amount of bone absorption and new bone formation necessary during repair.

Fig. 27—Difficulties arising from curvature of the tibia.

Fig. 28—Inlay graft taken from opposite tibia.

6. The injured leg only is involved. Although it is completely justifiable to use the opposite tibia as a source of graft when necessary, it is an advantage to use a technique which renders this unnecessary.

TECHNIQUE OF OPERATION

The skin is prepared in the usual way, and a tourniquet of the Esmarch type is used. The skin incision extends the whole length of the tibia over the middle of its subcutaneous surface. The periosteum is incised in the line of the skin incision and stripped from all surfaces of the bone. By clearing areas above and below the fracture first and then cautiously stripping the more adherent areas it is possible to expose the whole bone without tearing or damaging the periosteum. Bone levers passed between the posterior surface of the bone and the periosteum and slid to the end of the incision act as convenient retractors. The fractured surfaces are cleared of fibrous tissue, as little bone as possible being sacrificed during the process. The fibula is next refractured or if necessary divided subperiosteally. This is a most important step if the presence of an intact fibula prevents accurate alignment of the tibial fragments. The fracture is reduced, care being taken to align the fragments correctly, and the tibia is held firmly by clamps applied between the posterior

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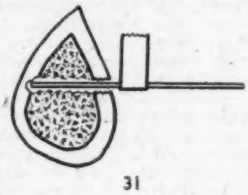

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Fig. 29—How a massive sliding graft is cut.

Fig. 30—The massive sliding graft in place.

Fig. 31—Cutting the graft. Division of one cortex and part of the other.

surface and the periosteum, so that the anterior two-thirds of the bone is left free. Using a large diameter single saw the bone is split as shown in fig. 29. If a saw of 1¾ inch diameter is used it is possible to divide one cortex, cross the medullary cavity, and partly divide the opposite cortex with a single cut (fig. 31). If a larger blade is available the bone can be completely divided. The longitudinal cut is made first, care being taken to keep parallel to the posterior surface of the tibia. The end cuts are then completed and the anterior half of the bone is detached by completing the division of the cortex on the anterolateral surface, using a chisel inserted through the medial saw cut. The longer fragment is laid across the fracture, held with clamps, and, after drill holes have been made through graft and bone, fixed in position with vitallium screws. The shorter fragment is placed in the gap left by the shift of the longer fragment and fixed with a single screw.

The leg is covered with a sterile towel and anteroposterior and lateral radiograms are taken to confirm satisfactory alignment of the tibial fragments. If the longitudinal cut has been made parallel to the posterior surface of the bone, anterior or posterior bowing is prevented by the graft which lies flat on the cut surfaces of each fragment. Should any such bowing be shown by the radiograms the graft is removed, the bed on the appropriate fragment is smoothed with a chisel to an extent sufficient to correct the bowing, and the graft is replaced. In practice, however, I have had no difficulty on this score. The much more common and more important medial or lateral bowing can, if present, be simply corrected by removing the lowest screw, angling the lower fragment as much as necessary, and reinserting the screw. The individual variation of the normal bowing of the tibia makes it difficult to be certain of correct alignment in all cases without radiograms, so these should never be omitted at operation. A slight angulation which, if detected then, can be corrected in a few minutes, presents a very different problem if first revealed by radiograms taken a few days after operation.

When a satisfactory reduction has been confirmed the skin and periosteum are closed, and a plaster is applied from the metatarsal heads to the groin, due attention being paid to correct moulding over the longitudinal and transverse arches of the foot. Either a lightly padded or an unpadded plaster may be used. My own custom is to use an unpadded plaster over stockinette, and to begin toe, quadriceps and leg-raising exercises the day after operation. There is some swelling in the second 24 hours after operation, but in my experience this is not serious and has never necessitated bivalving the plaster. If a padded plaster is used it should be replaced by an unpadded plaster two weeks after operation, leg-raising exercises being omitted until after this has been done. An unpadded plaster need not be changed for 6 weeks after operation. The patient is allowed to sit up in a

chair 2 weeks after operation and begin walking on crutches 2–3 weeks later. Full weight-bearing in plaster is not permitted for at least 6 weeks after operation.

Toe, quadriceps, and leg-raising exercises are carried out from the first, at least ten minutes every hour being occupied in these exercises. By gradually increasing the weight lifted the patient should be capable of practising weight-lifting with 40 or 50 pounds suspended from the ankle 6 weeks after operation.

Immobilisation in plaster from toes to groin is continued until there is clinical and radiological evidence of sound bony union. When union is firm the plaster is removed, a supporting bandage applied from toes to knee, and the patient is instructed in exercises to restore full mobility to the foot, ankle and knee. These final stages of treatment are best carried out in an organised rehabilitation centre, where the necessary mobilising exercises and a graded return to full activity can be carried out under expert supervision in a pleasant and psychologically stimulating atmosphere and environment.

Figs. 10 and 11, 18 and 19, and 22 and 23 show the fractures in figs. 8 & 9, 16 and 17, and 20 and 21 after grafting by the technique described, and figs. 24 and 25 show the normal appearance of the tibia a year after the operation.

CONCLUSION

The operative method described can be applied to any fracture of the shaft of the tibia except those within 2½ inches of the upper or lower joint surfaces. It appears to me to be mechanically and physiologically sound and to have advantages over other methods in common use, and I suggest that it is the operation of choice in a very large number of these fractures.

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DELAYED RECOVERY FROM TRILENE ANÆSTHESIA

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ANÆSTHETIST TO THE CORNELIA AND EAST DORSET HOSPITAL AND ANÆSTHETIST TO THE EMS

So much has been written about trichlorethylene ('Trilene') anæsthesia in the past six months, including some reports on fairly extensive trials, that I have been surprised that "delayed recovery" after its use, which I have often noticed in my own practice, has not been recorded. Some delay in recovery is noted after every administration of this drug, and occasionally it lasts so long as to cause anxiety.

The rate of recovery from inhalational anæsthesia depends on many factors but other things being equal it is inversely proportional to the relative lipoid solubility, and directly proportional to the relative volatility of the agent employed. Trilene, with a boiling point of 87° C., is the least volatile of the inhalational anæsthetics; and as it has a high degree of lipoid solubility, its elimination from the tissues will be slow.

I have used trilene chiefly with nitrous oxide anæsthesia (preceded by 'Omnopon Scopolamine' and 'Pentothal') for operations requiring little relaxation, such as tonsillectomies in adults, orthopædic operations and major dental operations. I have found it useful to depress the laryngeal reflex just before intubation in patients who have had pentothal or 'Avertin' and in whom it is proposed to maintain anæsthesia with nitrous oxide and oxygen; in such cases the coughing which follows intubation—and which so often expels the avertin—is avoided. In some cases I have used it because of its high analgesic quality, and at other times because it is non-flammable and non-explosive. Thus it is acceptable for circumcision or other minor operations on infants, and in the treatment of nævi by diathermy.

In most of these cases trilene has played a subsidiary rôle, or anæsthesia has been light and short, so that the patients' tissues have not been saturated with the drug. Nothing untoward has happened except occasional diminished respiratory excursion and tachypnœa; the recovery-rate has been normal and the anæsthesia satisfactory. In cases where trilene has played a greater part in the anæsthesia and the patient has been more deeply saturated, for example in adult tonsillectomies, there has been a prolonged period of recovery as compared with that following other agents, though this has not been serious enough to cause anxiety.

On two occasions when I have used trilene as the chief anæsthetic in long operations, the patients undoubtedly became saturated though anæsthesia was light throughout the operations; and in each case the period of recovery was long enough to cause anxiety and to deter me from choosing trilene for similar cases in future.

The first was an elderly man undergoing laryngofissure; the operation took just over 2 hours; premedication was by omnopon gr. 1/3, atropine gr. 1/100, induction by pentothal 0·25 g., maintenance by trilene and oxygen through a tracheotomy. This patient slept for 14 hours after the operation, was not sufficiently awake to take fluids by mouth for over 36 hours, nor fully recovered for another 12 hours. Vomiting was slight and fortunately there were no chest complications; at no time did the blood-pressure, pulse or respiration-rates cause anxiety. But such a long period of recovery is not desired after an operation upon the respiratory passages.

The second patient was a young and robust girl undergoing removal of an impacted wisdom tooth. Again the operation took two hours. Premedication was by omnopon gr. 1/3, atropine gr. 1/100 and induction by pentothal 0·5 g. The intended anæsthetic was nitrous oxide and oxygen preceded by a little trilene to facilitate "blind" intubation and to prevent coughing; unfortunately my nitrous oxide expired after the first hour and my spare cylinder proved to be empty. I was therefore constrained to continue the anæsthesia with trilene and oxygen for the remaining hour, and though anæsthesia was in so light a plane that lacrimation was constant, the patient became saturated with trilene. She was unconscious for 15 hours after the operation, unable to take fluids by mouth up to 36 hours after, and not completely recovered for a further 24 hours. As in the first case the blood-pressure, pulse or respiration-rates were not abnormal, but again the long period of recovery was a source of anxiety. This, like the previous case, showed that it is not desirable to let the patient become saturated with trilene.

In a third case a similar delay in recovery followed a short operation; the anæsthesia was deeper than in the other two but the operation lasted such a short time that it did not seem possible that the patient could have become saturated with the drug. She was a fat young woman undergoing interval appendicectomy. Premedication was by omnopon gr. 1/3, scopolamine gr. 1/150, given 1½ hours before operation; induction by penthothal 0·4 g., maintenance by intratracheal nitrous oxide, oxygen 20% and trilene. My choice of trilene in this case was purely experimental and I warned the house-surgeon to expect some delay in recovery. My warning was justified, for this patient, like the other two, took 36 hours to recover from the anæsthetic. In other respects anæsthesia was satisfactory, relaxation was good and there were no sequelæ.

In view of these experiences it seems that the uses of trilene as a safe anæsthetic are limited. It seems unwise to permit saturation of the patient with this agent whether by a short administration of sufficient depth to produce abdominal relaxation or by a longer administration in the first plane. This precludes the use of trilene in any but a supplementary rôle except in brief operations where first plane anæsthesia suffices. The long period of recovery and the occasional interference with the tidal volume render its use undesirable in thoracic surgery, and in any but the shortest of operations upon any part of the respiratory tract.

QUEEN ELIZABETH HOSPITAL, GATESHEAD.—The King has commanded that the new general hospital under construction by the county borough council of Gateshead shall be known as the Queen Elizabeth Hospital. It is expected that the maternity unit of the hospital will be opened within the next two months and the general ward accommodation about the end of the year. In all some 200 beds will be provided.

CLINICAL SIGNS OF DIPHTHERIA IN INOCULATED CHILDREN

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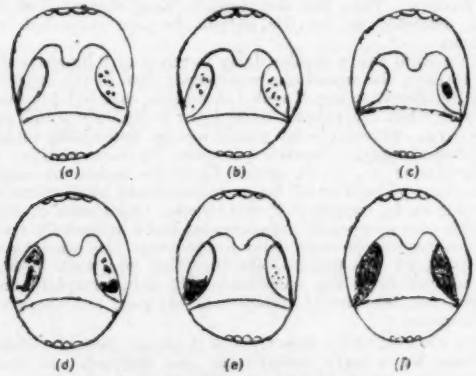
MOST children who have been inoculated against diphtheria do not contract the disease at all, but a few do. In these inoculated subjects diphtheria becomes a different disease, less severe but much more difficult to diagnose. I propose to give an account of 50 cases of diphtheria in inoculated persons observed from the onset of the disease to convalescence.

Of recent years several papers have been published giving the results achieved by inoculation against diphtheria and explaining the causes of failure to produce adequate immunity. The causes can be divided into extrinsic and intrinsic factors.

The extrinsic factors are mainly technical faults—e.g., incomplete inoculation by the injection of only one dose; insufficient dosage; failure to ensure uniformity of the preparation by shaking before use; or too short an interval between the injections.

There are three intrinsic factors: (*a*) inoculation of infants is ineffective at an age when the biochemical reaction, on which the production of antibodies depends, is poorly developed; (*b*) 3–4% of the children receiving inoculation do not respond to the inoculation and remain Schick-positive; and (*c*) the immunity is temporary. It has been observed that 22–34% of immunised children become Schick-positive after 4–7 years when they are living in a neighbourhood with low diphtheria incidence; in densely populated cities, however, where diphtheria is endemic, immunity may last much longer. Dudley and his colleagues (1934) recorded, in London, a Schick-relapse rate of 12% after 5 years; other recorded rates are: in America, 17·9% after 10 years (Young and Cummings 1932) and 22% after 6–7 years (Schwartz and Janney 1938); in Canada, 34% after 5 years (Fraser and Brandon 1936); in Iceland 26% after 4 years (Sigurjónsson 1939); and in England, 2% after 1 year (Fulton et al. 1942).

The clinical diagnosis of diphtheria is based mainly on the following signs: the presence of membrane;



(*a*) One tonsil covered with minute spots.
(*b*) Both tonsils dotted with deposit resembling follicular tonsillitis.
(*c*) A single patch on one tonsil. (*d*) Several patches on each tonsil.
(*e*) A patch occupying part of one tonsil; the other tonsil covered with minute spots. (*f*) Whole surface of both tonsils covered with deposit.

involvement of lymph-glands; œdema of the tonsils and the uvula; oral fœtor; and nasal discharge. The most striking difference between typical diphtheria and diphtheria in inoculated persons lies in the appearance of the membrane. The extent of the membrane in the throat varies. In common diphtheria it may consist of one or more patches on one or both tonsils, which tend to spread quickly and to cover more or less the whole of both tonsils and to involve later the anterior and posterior faucial pillars, the soft palate and uvula within 12–48 hours. Appearances suggestive of follicular tonsillitis are comparatively uncommon at the time of admission to hospital. In inoculated children, on the other hand, the type which resembles follicular tonsillitis is very common.

In the present series there were 3 cases in which only one tonsil was so affected (fig. *a*) and 9 cases in which both tonsils were dotted with minute deposits in the crypts, resembling a follicular tonsillitis (fig. *b*). In 7 cases the membrane presented itself as a single small patch on one tonsil (fig. *c*), and in 11 cases on both tonsils (fig. *d*). In 9 more cases a small patch occupied part of one tonsil whereas the other tonsil was covered with minute spots (fig. *e*). In only 10 cases of the series was the whole surface of both tonsils covered with deposits (fig. *f*). In contrast with ordinary diphtheria, the deposits, which do not usually coalesce in inoculated cases, spread slowly and rarely involve the anterior faucial pillars or soft palate. In ordinary diphtheria the membrane as a rule is at first firmly adherent to the subjacent mucous membrane, and if an attempt is made to scrape it off, there is bleeding. In inoculated cases however the membrane can be easily wiped off, even in the earliest stages of the disease, leaving a pale greyish area of mucous membrane which does not bleed. In only a quarter of the present series was the membrane firmly adherent.

There is usually a characteristic and unpleasant fœtor from a diphtheritic throat. It was found in 19 cases of the series. Some degree of adenitis is common in diphtheria (the severer the case the more intense the adenitis), and this was present in 23 cases; 2 cases of very severe lymphadenitis and periadenitis were encountered and no case of "bull-neck." The temperature reached the high levels of 102–103° F. in 17 cases; in 13 cases it was less than 100° F., and 21 patients of the series had no rise of temperature at all. Œdema of the soft palate, the faucial pillars, or the uvula was seen in 4 cases. Mucopurulent nasal discharge associated with nasal obstruction is often observed in diphtheria; 7 cases have had a nasal discharge in the present series.

It stands to reason that even in severe diphtheria one or more of the criteria mentioned above may be absent; but consideration must be given to all of them in diagnosing a case of diphtheria in an inoculated patient.

Complications.—Heart complications are the most dreaded, and are responsible for the greatest number of deaths in diphtheria. In the series of 50 cases I found 6 cases of cardiac disorder. In each case myocarditis was present but in none was a lesion of the conducting system demonstrated by an electrocardiogram. All of them recovered within 2–6 weeks.

Paralysis of the soft palate, common in ordinary diphtheria, was found in 2 cases. Peripheral neuritis of the legs, characterised by complete absence of the knee-jerks, occurred in 4. Neither pharyngeal nor respiratory paralysis was observed.

DISCUSSION

The children had been inoculated either with APT or TAF. The inoculation was complete in all but one case, where a one-shot method was used. The interval between the inoculation and the onset of the disease varied between 3 months and 6¾ years. One case showed that sufficient immunity is not achieved when the second injection of APT has just been given. The time which elapses before the child is protected is at least 6 weeks after the second injection of APT. Thus a child should be inoculated at latest during the summer months if he is to be protected by autumn, when the morbidity of diphtheria is higher.

The predominance of gravis infections is evident in the present series; 78% of the cases were caused by a diphtheria gravis strain, 18% by intermedius and 2% by mitis. The virulence test was found to be positive in all instances.

The throat lesion often resembles a follicular tonsillitis. Hence it may be asked whether these cases have to be looked upon as tonsillitis diphtheria-carriers. The difference between a tonsillitis in a diphtheria-carrier and a diphtheria in an inoculated person is on clinical grounds as follows:

The onset in tonsillitis is usually sudden, the temperature high, the child flushed and complaining of a sore throat; in diphtheria the onset is often insidious, the temperature fairly often normal or moderately increased, the child often does not complain of a sore throat.

The deposit in tonsillitis is patchy and is not usually con-

fluent; the deposit in diphtheria in inoculated person spreads, though not rapidly, within 48 hours.

Tonsillitis may lead to endocarditis. Diphtheria may lead to paralysis, peripheral neuritis and myocarditis, but very rarely to endocarditis.

The Schick-test is negative in a diphtheria-carrier suffering from a tonsillitis, but it is positive in an inoculated and Schick-relapsed person suffering from diphtheria.

The percentage of carriers (Topley and Wilson 1941, Dudley et al. 1934) is about the same in inoculated and non-inoculated persons and amounts to about 6%; but it has been reported from several sources that virulent diphtheria organisms are more often found in inoculated than in non-inoculated carriers. The percentage of contact carriers in Newcastle was as follows:

	Contacts	Positive on culture %
1938	3541	7·51
1939	3573	5·45
1940	1736	6·5
1941	3101	6·6
1942	3903	6·3

Unless we regard only complicated cases as true diphtheria in inoculated subjects, it is obvious by analogy with ordinary diphtheria that uncomplicated cases must occur.

The danger of diphtheria in inoculated children is twofold:

1. The throat lesion may clear up perhaps without any treatment, but a complication may follow, the most serious being myocarditis. After having a "sore throat" the child looks pale and is rather listless. The clinical signs in the heart are usually insignificant: the area of cardiac dullness may or may not be enlarged and the heart sounds are often normal, but the blood-pressure is often lowered. Only by means of an electrocardiogram can the diagnosis be confirmed. The dangers of an untreated myocarditis are obvious.

2. From the epidemiological point of view: the disease may be conveyed to other members of the family or to schoolfellows.

It is a remarkable fact that not one fatal case occurred among the children who were inoculated in Newcastle and subsequently contracted diphtheria; but the risk of death in inoculated cases is not entirely eliminated as has been shown by reports from other sources (Glover and Wright 1942).

Treatment.—In our experience a comparatively small amount of serum is sufficient for treatment. Scarcely more than 10,000–20,000 units of antitoxin have been used. The reason is that an inoculated child is capable of much more rapid antibody-production than the non-inoculated subject, when suffering from diphtheria (Glenny and Südmersen 1921). The tonsils become free from deposit in a few days. In 13 cases of the present series the throat was clean within three days, in 9 cases within two days, in 8 cases within four days. In 3 cases the deposit disappeared in one day, in 3 other cases it did not disappear before the seventh day.

As might be expected, the number of inoculated children admitted here with throat lesions is steadily increasing. Recently we received a letter from a family doctor, which read as follows: "The patient has never had any diphtheria antitoxin as I did not for a moment think that he had diphtheria. He has been immunised." It should be borne in mind that a throat lesion in a child, though inoculated against diphtheria, might be a diphtheria and one should not be readily satisfied with the diagnosis of an ordinary tonsillitis. It would be wrong to wait until the throat lesion of an inoculated child looked "suspicious": often the lesion never looks "suspicious" at all,—as some of the accompanying drawings show. To be on the safe side, a small amount of serum can always be given after a Schick test has been done. In general practice a Schick test can hardly be done as a routine on every inoculated child who develops a sore throat, but there will always be an element of doubt in the diagnosis of an uncomplicated case, if the Schick test be omitted. A diagnosis of diphtheria in an

CLINICAL FINDINGS IN 50 CASES OF DIPHTHERIA IN IMMUNISED PATIENTS

No.	Age (yr.)	Immunised with*—	Diph. after (yr.)	Diph. strain	Throat-lesion†	Fœtor	Glands	Œdema	Nasal discharge	Complication
1	6	TAF	4 9/12	I	c	–	–	–	–	..
2	6	APT	5/12	G	d	–	–	–	+	..
3	10	APT	1 3/12	I	f	+	+	+	+	Palatal and ciliary paralysis, periph. neurit., myocard.
4	9	APT	4	I	f	–	+	–	–	..
5	18	TAF	3/12	G	d	–	+	+	–	..
6	5	TAF	4/12	M	b	–	–	–	–	..
7	16	APT	4	G	d	–	+	–	–	..
8	13	APT	6/52	I	e	+	+	–	–	..
9	21	TAF	1 6/12	G	e	–	+	–	–	..
10	7	TAF	..	G	f	+	–	–	–	..
11	5	APT	3 6/12	G	f	–	+	–	–	Myocarditis
12	9	APT	9/12	G	e	–	–	–	+	..
13	11	TAF	2	G	e	+	–	–	–	..
14	7	APT	5/12	G	a	–	–	–	–	..
15	4	TAF	9/12	I	b	–	+	–	–	Myocarditis
16	4	TAF	2 4/12	G	d	+	–	–	–	..
17	6	TAF	3 3/12	G	e	+	+	–	–	..
18	4	TAF	2 5/12	G	f	+	–	+	–	Myocarditis
19	10	TAF	3	G	b	–	–	–	–	..
20	4	TAF	1 6/12	G	c	+	–	–	+	..
21	14	APT	7/12	G	b	–	+	–	–	..
22	5	TAF	2	G	b	–	+	–	+	..
23		APT	1	G	e	–	–	–	–	..
24	13	APT	7/12	G	c	–	+	–	–	..
25	8	TAF	6 8/12	G	d	+	–	–	–	..
26	5	APT	1	I	b	–	–	–	–	..
27	8	APT	1	G	d	–	+	–	–	Periph. neurit.
28	8	APT	1	G	e	–	+	–	–	..
29	9	TAF	6/12	G	b	–	–	–	–	..
30	:	APT	5	G	e	+	+	–	–	..
31	9	APT	6/52	G	d	–	+	–	–	..
32	13	TAF	6/12	G	a	–	+	–	+	..
33	10	APT	8/12	I	a	–	–	–	–	..
34	11	APT	1 2/12	I	b	–	–	–	–	..
35	11	APT	1	G	N	–	–	–	–	..
36	5	TAF	4	?	e	–	+	–	–	..
37	12	APT	1 3/12	G	d	+	+	–	–	Periph. neurit.
38	10	TAF	5	G	d	+	–	–	–	..
39	5	TAF	1 2/12	G	d	+	+	–	–	..
40	8	APT	1	G	c	–	–	–	–	..
41	7	APT	10/12	G	f	+	+	–	+	Myocarditis
42	10	APT	11/12	G	f	+	–	–	–	..
43	9	APT	1 4/12	G	f	–	+	+	–	Myocarditis; palat. paral.
44	4	TAF	3	G	f	–	–	–	–	..
45	9	APT	10/12	G	d	–	+	–	–	..
46	15	TAF	3	G	c	+	+	–	–	..
47	4	APT	1	G	c	–	–	–	–	Periph. neurit.
48	5	APT	1/52	G	b	+	–	–	–	..
49	8	TAF	4 2/12	I	f	+	–	–	–	..
50	9	APT	1	G	e	+	+	–	–	..

Notes at foot of previous column.

* APT was given in two doses of either 0·1 and 0·3 c.cm. or 0·2 and 0·5 c.cm. except to cases 8 and 35, where three doses of APT were given. TAF was given in three doses of 1 c.cm.

† The small letters refer to the illustrations in the figure.

I, intermedius; G, gravis; M, mitis; N, nasal.

inoculated person is based on clinical signs, bacteriological findings and state of immunity.

I wish to thank Dr. J. A. Charles, MOH of Newcastle-on-Tyne, for permission to use the clinical material in the hospital and for permitting me to publish this paper; and Dr. R. Norton for the bacteriological data.

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PALESTINE

HEALTH INSURANCE

THE Palestine workers sick-fund—Kupat Holim—has reached its 30th anniversary. Founded by a group of agricultural labourers in Judæa it has become a country-wide institution, with 210,000 members and dependants, covering 41% of the whole Jewish population of Palestine, with an annual budget of £600,000. Of this total the government pays £600 for school hygiene and infant-welfare work. In other countries the government would probably provide 20% of the budget, instead of this 0·1%. The sick-fund has therefore to demand heavy contributions from its members, from 130 to 650 mils (about 2*s.* 6*d.* to 13*s.* 6*d.*) a month according to the wages earned. Even this scale does not balance the budget, and extra charges have to be made for convalescence, dental benefits and the like. The fund has over 500 beds in its own institutions, to supplement the services provided by the great Hadassah Hospital and municipal hospitals, and maintains a high standard in all its services. Besides modern hospitals it supports a number of convalescent homes and clinics in the towns and villages. By centralising medical supplies it can provide for all essential medical needs, even in war-time at a cost which compares favourably with that of other institutions, including government ones. It provides maternity benefit, maintains antenatal, infant and child-welfare clinics, and supervises the housing of children in rural settlements. The fund's activities might well be studied by those planning a comprehensive medical service elsewhere.

AN AMERICAN HOSPITAL

The best American hospital in the Middle East has arrived in Palestine from Eritrea. It is staffed by 24 specialists in various branches, 3 dentists and a full complement of nurses, and with its 1000 beds will probably be the biggest hospital in Palestine. Built around the contour of a hill, the 34 ward buildings adjoin the administrative, surgical, laryngological, psychotherapy and X-ray departments and the laboratory. The hospital will have its own water-supply and laundry.

INFANT WELFARE IN SOUTH PALESTINE

Under the supervision of Dr. D. Murray, senior medical officer of the south district in Jaffa, five new infant-welfare centres have lately been opened. Most of them have a resident nurse, who advises on general cleanliness. Children attend once a fortnight from the age of one month to two years; those under weight receive supplementary food. The main difficulty is to convince parents, who are mostly simple folk, that the centres are maintained for their benefit, but once convinced they attend regularly. It is hoped that the centres will reduce child mortality, which has in the past been extremely high in this region.

Charterhouse Rheumatism Clinic has set out the main known facts about vitamins and near-vitamins on a card folder. This gives the international units, daily requirement (D is on the low side), toxic dose, function, normal blood level and tests for deficiency. In the next edition K will no doubt be promoted, having a real and known function in human nutrition. The card will be sent free on application to 56, Weymouth Street, W.1.

Reviews of Books

War and Disease

RALPH H. MAJOR, MD. (Hutchinson. Pp. 190. 12*s.* 6*d.*)

Professor Major has an easy style suited to his romantic conception of history. Disinclined to tax the reader with dry analyses of social, economic and political forces, he paints a Delacroix picture, in which "the Corsican Colossus," "the Lady with the Lamp," Dunant, Larrey, Gorgas and other persons of importance look out of the frame colourfully enough to keep the story arresting. The chapters would make a good set of talks to a general audience, but as reliable medical or military history they are too anecdotal and sweeping. In the chapter entitled "After Versailles" the author carries his account up to 1941. Seeing us across the Atlantic he has been misled by some of the contemporary documents into stating that "it was generally agreed that most Londoners were in frequent, many in constant, need of some drug to carry them off to temporary oblivion, while a hell of noise, crash, and screaming sirens raged," and that "British physicians describe a 'new' disease, 'shelter fever,' apparently the same as the trench fever that was so prevalent during the World War. The conditions of life in the air-raid shelters resemble closely those in the trenches, where trench fever was transmitted by the louse." Similarly, Culpin's strictures in 1940 on "diagnostic and therapeutic inertia" in regard to neurosis have been taken too literally.

Microbiology and Man

JORGEN BIRKELAND, PH D, assistant professor of bacteriology, Ohio State University. (Baillière. Pp. 478. 22*s.*)

THIS book describes the part played by bacteria in everyday life. The material is arranged in the conventional manner; general properties of organisms are followed by sections on infection and resistance, on the common infectious diseases and on the bacteriology of food, milk, water, sewage and soil. Emphasis is placed on methods for obtaining information and on the inferences that can properly be drawn from observations. The importance of epidemiology is stressed and it is good to find elementary students taught about John Snow and William Budd. The book is thoroughly up to date and contains descriptions of the electron microscope, of the newer antibiotic substances and a picture of a sneeze. Methods advocated for the control of infection are sound and there are many valuable figures and charts. Some subjects receive too little space, but if too little is said about the salmonellas we are told about the bacteriology of swimming pools, about the pasteurisation of beer and the detection of adulterated strawberry jam by planting the seeds for timothy.

Infant Feeding in General Practice

(2nd ed.) J. VERNON BRAITHWAITE, MD, FRCP. (Wright. Pp. 165. 7*s.* 6*d.*)

The *Times*, advocating the encouragement of breast-feeding, lately quoted an opinion that doctors are the greatest enemies of natural feeding in that the commonest stated cause for weaning to the bottle is medical advice. Doctors may reasonably hold that responsibility for the prevailing easy resort to bottle-feeding rests on many shoulders besides their own, but in so far as the reproach is justified Dr. Braithwaite's book, if widely read by those to whom he addresses it, should do much to remove it. Breast-feeding and its difficulties, bottle-feeding, nutritional disorders and allied conditions are dealt with in succession. Dr. Braithwaite writes vigorously, basing his advice on experience and common sense, and illustrating it with well-chosen cases. The successful management of breast-feeding and the diagnosis and treatment of the dyspepsias of infancy, in practice so perplexing and depressing, are perhaps made to appear a little easier than the practitioner may find them; but the lines on which they should be tackled are clearly laid down and the accepted classification of the dyspepsias by Czerny and Finkelstein is well summarised and expounded. To read the book through and to have it on his shelf should really help the doctor who wishes to accept his due responsibility for the babies in his practice.

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THE LANCET

LONDON: SATURDAY, AUGUST 14, 1943

BABEL IN THE DRUG TRADE

IT is questionable whether the British drug trade, in its present form, makes the most of its great opportunities for public service. The war has revealed unexpected deficiencies. Though the British Empire is capable of supplying every animal, vegetable and mineral substance required in the manufacture of drugs, we were in 1939 largely dependent on outside sources for essential remedies such as digitalis, atropine, hyoscine, ergot, quinine and agar; and we were unable to manufacture all the sulphonamides, the barbiturates or the synthetic vitamins we needed without importing intermediates from other countries. Our dependent peoples and their cattle and crops were starved of essential drugs and parasiticides. True, the drug industry, like the rest of the country, was not prepared—was not organised—for war. But is it prepared for peace? Many people had hoped that the industry would have developed along more progressive lines as a result of the war, but it seems to have been exhausted by the effort of producing the Therapeutic Research Corporation, not yet a flourishing offspring. Particularly disappointing is the attitude of parts of the trade towards the canons of ethical nomenclature.

The Pharmacy and Medicines Act [1] of 1941 demands that if a substance, not being a poison included in the Poisons List, is described in the British Pharmacopœia or the British Pharmaceutical Codex, the description set out at the head of the monograph shall appear on the label. In other cases the accepted scientific name or other name descriptive of the true nature of the substance, constituents or ingredients must appear. The disclosure must be clearly legible. Unfortunately however there is nothing to prevent the manufacturer from putting an additional name on the label; there is no control over the size of type used for the various names on the label or in advertisements, and it is open to manufacturers to put the maximum stress on the brand name and the minimum on the official designation. The Council on Pharmacy and Chemistry of the American Medical Association very rightly refuses to recognise proprietary names for articles which are included in their pharmacopœia or national formulary. In the marketing of original articles," they say,[2] "the legitimate interests of the producer are fully served by identifying such products by appending the name or initials of the manufacturer or by the use of a general brand mark." The same must be true over here, yet a barbiturate which has been in the British Pharmacopœia for eleven years has recently been issued under a proprietary designation. The whole of the work on the anticoagulant drug 3:3-methylene-bis-(4-hydroxycoumarin) was done in America; neither British medicine nor the British drug firms have made the smallest contribution to knowledge in this field, and the synthesis of the drug is now child's play; the Americans have adopted "dicoumarol" as its short name: nevertheless a number of British manufacturers have issued it under their own proprietary designations. And distributors as well as actual producers join in the game—so successfully that we were able on June 26 (p. 823) to list 54 trade names for sulphanilamide, most of them admittedly continental.

The British Pharmacopœia Commission, through its nomenclature committee, has tried to improve matters by providing an approved name for drugs at an early stage of their introduction to the medical profession. Through this committee the commission is in touch with trade organisations, the manufacturers themselves, and the Comptroller of Patents and Trade Marks. The Comptroller, when granting licences to use enemy patents, can require that any substance made under the licence shall be marketed under one uniform non-protected name, but it is doubtful whether he has felt justified in making it a condition that the unprotected name shall be the only one. Some manufacturers now use the approved name with a suffix, but other members of the trade have not coöperated so well. Thus the German drug 'Cardiazol' was officially designated leptazol, but British preparations of it are still being sold under half a dozen names. It cannot be pretended that leptazol is an important enough drug to justify all this diffusion of effort. The very alphabet can no longer cope with this multiplication; it is now hard to find a name for a genuine new drug which has not already been registered as a synonym for an old one. The strongest individualist would probably agree with the Socialist Medical Association [3] that preparations should be standardised as regards name, package and price, and that firms should concentrate on particular products, thereby eliminating wasteful competition. It is difficult to frame legislation about nomenclature which cannot be circumvented, but the present tactics look unsound from the narrowest viewpoint of self-interest. The British drug industry has not always been able in the past to meet the competition of Germany and the USA, and it seems unwise to divide its forces by internecine competition. This, however, is not the doctor's concern; all he asks is that his task shall not be made more difficult by a confusion of names, and that some authoritative body shall be given powers to bring and keep order in this chaos not as a war-time measure but for good.

DELIVERANCE FROM DIPHTHERIA

A CHILD'S liability to contract diphtheria can be measured. His resistance to infection can be greatly increased by immunisation. Those who develop the disease can almost always be saved by giving antitoxin on the first day. Yet in this country diphtheria is still the principal cause of death in children aged 5–10 and the third commonest cause at ages 1–5 and 10–15.

RUSSELL'S report [4] published by the Medical Research Council provides ample evidence of the value of active immunisation, and shows the wisdom and importance of the present efforts of the Ministry of Health to popularise it.[5] In assessing the effect of immunisation it has to be remembered that little change in the incidence of the disease in any particular

1. Chapman, H. E. The Law Relating to Medicines, Bedford, 1942.
2. New and Non-Official Remedies, 1941.
3. Pharmaceutical Services in Wartime, 1943.
4. Epidemiology of Diphtheria during the last Forty Years. By W. T. Russell, D.SC. *Spec. Rep. Ser. med. Res. Coun., Lond.* 247. HMSO. 1s.
5. Immunisation against Diphtheria: details of publicity campaigns. Produced by the Ministry of Health, the Ministry of Information and the Central Council for Health Education.

area can be expected until a substantial proportion of the children have been protected—preferably in all age-groups. In the United States the authorities concentrated at first on immunising the school population, but it was GODFREY, director of the New York State department of health, who expressed the opinion that active immunisation of 50% or more of the age-group 5–14 had no definite effect on diphtheria incidence in the community; whereas when the immunisation of 30% or more of the children under 5 was added there was an immediate decline in the disease. In only a few cities—notably New York and Toronto—are the numbers immunised large enough to afford statistical confirmation of the efficacy of preventive inoculation. In both these places there was a downward trend in the mortality before active immunisation started. Thus in New York the death-rate from diphtheria, which was 785 per 100,000 in 1894, fell to less than 300 in 1900 and to below 100 in 1920. In that year the immunisation of school-children began, and by 1928 50% of the school population was "protected." The authorities then concentrated on pre-school children, and in 1940 about 60% of these had been immunised. The result, as RUSSELL shows, is that diphtheria has been virtually eliminated as a cause of death, the mortality now being 1·1 per 100,000. A similar story can be told about the morbidity. In both New York and Toronto, it was falling before immunisation began; but the difference between the actual and expected case-rate in the post-immunisation period is significant and this difference is increasing with time. To those who attribute the accelerated rate of decline to hygienic improvements, it can be said that the effects of such improvements will show themselves equally in cities where immunisation is neglected.

But in such places diphtheria has not decreased to anything like the same extent. It is tragic that progress in immunisation against diphtheria in Britain has been so slow, and the general practitioner in particular has a large part to play in the present national campaign by his attitude and advice as well as by active participation. The children whom it is most important to protect are those between 1 and 5 years old. Experience has shown that parents may be reluctant to submit their youngest children and they must be made to realise how deadly diphtheria is at this age. The use of alum-precipitated toxoid in two doses at an interval of at least a month, commencing with 0·2 c.cm. and following with 0·5 c.cm., is of proven efficacy, but the APT should be well shaken immediately before use. (It will even settle out in the syringe and falsify results if steps are not taken to prevent this from happening.) A "refresher" dose, after an interval of say five years, is indicated for young children, especially those who were inoculated in infancy and are about to enter school. A single dose of 0·3–0·5 c.cm. suffices for this purpose. There is no danger of anaphylaxis. Though not essential, a Schick test three months after inoculation is completed serves to reveal the few in whom it is necessary to repeat the process to secure the necessary protection. From time to time persons are found who do not become Schick-negative until they have had three complete courses of inoculation. Happily they are uncommon; and if a high proportion of children of pre-school and school age were given two doses of alum-precipitated toxoid, those in whom the protection was incomplete would have little to fear from diphtheria, for the risk of an epidemic would have been removed.

There is another aspect of this protective inoculation which has a bearing on general practice—namely, the diagnosis of diphtheria in inoculated persons. Elsewhere in this issue Dr. NEUBAUER gives reasons for the failure invariably to secure protection and it will be evident that practitioners must expect to see now and again a case of diphtheria in an inoculated or allegedly inoculated subject. There has been a tendency to allow procedure to be influenced by the fact of inoculation. In some cases antitoxin has been withheld pending a bacteriological report, in the belief either that the disease cannot be diphtheria because the patient has been inoculated, or that he must be partially protected and there is therefore no urgency. This is a grave mistake. A proportion of those in whom inoculation fails to give protection appear to have a defective response mechanism, and they need all the help they can get in the form of antitoxin. When there is reason to suspect diphtheria in an inoculated person, the action taken should be the same as if he has not been inoculated.

Interesting speculations arise as to what will be necessary to maintain an immune population when inoculation is practised sufficiently to prevent epidemic diphtheria and greatly to reduce its endemic prevalence. Bacteriologists recognise three ways in which individual immunity to the disease may be secured. The immunity may be: (1) natural or inborn; (2) acquired by clinical or subclinical attack or by exposure to repeated small doses of diphtheria organisms which do not give rise to any manifest infection; or (3) artificially produced by the injection of immunising agents. The joint contribution of (1) and (2) to the "protected" population can be ascertained by Schick-testing the children, and a sample inquiry of this description, made in Baltimore and described by FROST, is mentioned by RUSSELL. At the age of 5, some 21% were Schick-negative (i.e., immune), but by the age of 15 the proportion had risen to 68%, although only 12% were known to have suffered from clinical diphtheria. FROST'S figures show that the children had been immunised naturally at an average rate of 4·3% per annum in the first 5 years of life, 6·1% per annum between 5 and 10, and 3·2% per annum between 10 and 15. He contrasted these figures with the clinical-diphtheria rates at the same ages and concluded that "with increasing age, children suffering infection with the diphtheria bacillus are progressively likely to develop immunity rather than the disease." It is known that a population in an environment which lends itself to the acquisition of immunity naturally in this way is more readily protected by inoculation; the basal immunity established by infection is stimulated to a high level of active immunity by subsequent inoculation. The question arises, what inoculation procedure should be adopted when the opportunity for acquiring immunity in the natural way is diminished? It may be found necessary to revert to three doses in place of two, the first establishing basal immunity and the other two stimulating a high response. There are some engaged in diphtheria inoculation work now who are not satisfied that two doses of an antigen are as good as three.

ANTI-THYROID SUBSTANCES

SEVERAL different researches have lately focused attention on substances which impair the functional activity of the thyroid gland or inhibit the action of its secretions. For many years it has been known that the condition of the thyroid in animals can be modified by the addition of certain greenstuffs to the diet. Thus the leaves of cabbage and other brassicæ have a goitrogenic effect in rabbits[1 2] and the same effect can be produced in rats by feeding brassica seeds[3 4] and soya bean.[5] The changes in the thyroid have been described as diffuse parenchymatous goitre[6] involving increase in size with hyperplasia and loss of colloid. Remarkable changes in thyroid weight over long periods, from an average of 0·18 g. to one of 19·5 g., are recorded in rabbits.[1] The earlier accounts differed as to whether these changes could be inhibited by administration of iodine, as to the resulting metabolic state, and as to the nature of the inciting mechanism. It may be noted, however, that simultaneous changes have been recorded in the anterior pituitary gland[7] and that the thyroid changes do not take place in the absence of the pituitary gland.[8] It is likely, therefore, that the changes in the thyroid are secondary to disturbance of the pituitary thyrotrophic function.

Attempts to isolate the causative substance present in rape seed[9] suggested that it might be a derivative of thiourea, and it was found that allyl-thiourea in a daily dose of 20 mg. caused the typical size and histological changes in the rat thyroid, as well as the associated and probably primary changes in the pituitary. This observation was slightly anticipated by the reports that thyroid hyperplasia could be induced in rats by thiourea[10] and sulphaguanidine.[11] A more recent investigation has shown that the effect can be produced by sulphonamides and thioureas in rats, mice and dogs, but not in chicks or guineapigs.[12] An addition of 3% of sulphaguanidine to the diet of immature rats increased the size of the thyroid by 3½ times in two weeks. Sulphanilamide was less active in producing the reaction than sulphaguanidine, sulphadiazine, or sulphapyridine. Thiourea was eight times more effective than sulphaguanidine. Diethyl-thiourea and allyl-thiourea were also active; acetyl-thiourea and thioacetamide were inactive under the same conditions. An addition of 20% of sulpha-guanidine in the diet lowered the basal metabolic rate (BMR) of rats to −20 at 10–14 days. The metabolic effect was not prevented by iodine, but could be entirely prevented by thyroxine. The thyroid changes were prevented by hypophysectomy. In a coincident report[13] very similar results are described, the "goitrogenic" activity of a number of compounds decreasing in the order thiourea, sulphadiazine, sulphapyridine, sulphathiazole, sulphaguanidine, sulphanilylurea, sulphanilamide, and sulphasuxidine. The changes in the thyroid are attributed to failure in synthesis of thyroid hormone, and both reports emphasise that the metabolic changes are those characteristic of hypothyroidism, despite the apparently hyperplastic state of the thyroid. It is curious that a thyroid condition mediated by pituitary derangement and leading to hypothyroidism should be so different from that produced by pituitary excision. Clinical use of these substances in cases of hyperthyroidism was soon attempted, and it is reported[14] that daily administration of 1–2 g. of thiourea, or 0·2–1·0 g. thiouracil to hyperthyroidic patients brought relief of the symptoms after a latent period of a week or two. Cessation of treatment led to a return of the hyperthyroidic condition, while overdosage resulted in the appearance of the early signs of myxœdema after about 5 weeks. It is not yet evident to what extent there may be danger of hypothyroidism following the prolonged use of sulphanilamide and related substances, but evidently this contingency must not be overlooked.

The substances discussed above are not known to occur naturally in the body and there is as yet no suggestion that anti-thyroid action of the type described plays any part in the normal regulation of the gland. On the other hand, there is news that a naturally occurring substance, paraxanthine, is capable of inhibiting the effect of thyroxine on the frog's heart, and the two substances can be titrated accurately against each other[15]; 0·22 μg. of either natural or synthetic paraxanthine inhibits the effect of 1 mg. thyroxine. Similarly, an optimal dose (20–25 μg. per day) of paraxanthine by mouth lowers the BMR of the intact rat. The concentration of paraxanthine in ox blood is 0·2–0·6 μg. per c.cm.; so, assuming a similar concentration, the total amount present in the blood of a rat would be 5–15 μg., which is within the range of amounts which cause pronounced changes in BMR. The authors of this report conclude that the metabolic state of an animal is controlled not merely by the amount of thyroid secretion but by the balance between the secretion and the endogenous paraxanthine.

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13. Astwood, E. B., Sullivan, J., Bissell, A., Tyslowitz, R. *Ibid*, 1943, **32**, 210.
14. Astwood, E. B. *J. Amer. med. Ass.* 1943, **122**, 78.
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MORE HEALTH LEAFLETS.—The Central Council for Health Education maintains its output of pleasantly coloured and cleverly written leaflets on aspects of health and preventive medicine. Three of the latest (The war on disease, Right dress for health, Just nerves) contain, in little space and easy language, a remarkably solid dose of public-health teaching. *Just Nerves* is specially good, designed to give the anxious just that bit of insight which will lift them out of misery into patience or even move them to make an active effort towards recovery. *Measles is a dangerous disease* is another good one, setting out on the back the early symptoms and inside reminding the mother that measles begins like a cold, and is most infectious before the rash appears. *The Pasteurisation of Milk* is evidently intended for a different public. It is written by Dr. G. S. Wilson and sets out the facts about pasteurisation neatly and scientifically but not in the simple terminology of the other leaflets.

Annotations

IMPRESSIONS OF RUSSIAN SURGERY

THE British surgical mission to Russia, which included Surgeon Rear-Admiral Gordon-Taylor, Mr. Rock Carling, Major-General D. C. Monro and Mr. R. W. Watson-Jones, has returned, after inspecting hospital arrangements as far forward as Vyazma and studying the work at sorting, field and mobile hospitals as well as medical institutes in Moscow. Their general conclusion was that the Russians have nothing fundamental to learn from us, nor we from them—we all observe the same principles and differ only in the details of their application. Nevertheless, their young surgeons would certainly benefit from a spell in some of our best hospitals and ours would find the practice of Russian clinics highly stimulating. The mission were struck by the vast scale on which surgery is done in the USSR. For example, it was a surprise to find Professor Yudin doing three operations in one day for the replacement of permanently obstructed œsophagus by jejunum; these were his 89th, 90th, and 91st such operations, and he spoke of a colleague who had done even more. The anæsthetic was spinal, with some infiltration of the mesenteric roots, and was entirely effective. The rapidity of Yudin's work was notable and the bowel was carried up to the level of the hyoid with apparent ease. In an emaciated woman this was a formidable operation, but a week later she was in good condition. Yudin numbers his gastrectomies by the thousand, with large numbers of them total—he is, in fact, something of a prodigy among abdominal surgeons. In war-time he has turned his attention to compound fractures. His views on excision of the wound differ from ours in this respect: he is not content to limit his intervention to cases reaching operation within 6–12 hours. Whenever his cases reach the place where operation can be carried out in satisfactory circumstances—be it 6, 8, or 10 days after wounding and whatever the state as to infection—he excises all necrotic tissue, makes a very large hole into the limb, and keeps it wide open by suturing the skin to the deep fascia not only in the primary wound but in any counter-opening that may be needed to secure free drainage. To the questions whether this procedure would not open up every possible fresh plane for the spread of infection, and how one can be sure of avoiding nerves and arteries in the swollen tissues, Yudin could reply that he has followed this course in many hundred cases without encountering such disasters. On the question of the skin-tight plaster, which was described in detail by Pirogoff in 1856, Yudin and other Russian surgeons are less definite. They believe in immobilisation as complete as possible, and employ a skin-tight plaster whenever they feel it is safe, but they prefer to watch a case for 3 days before they apply the plaster. They like plaster for transport, especially for long journeys, but except in the most straightforward wound they have misgivings as to the omission of padding unless the plaster can be watched continuously. The Soviet Army medical organisation is designed to segregate all types of case from the outset, at sorting hospitals five miles behind the firing-line. When this can be done (and it is not always practicable in warfare of a different kind from theirs) it ensures that all the specialists—for head, chest, jaw, plastic surgery, fractured femur and so on—receive their cases in their special hospitals or clinics after they have been treated from the first by young members of their teams who know just what their seniors like done. Our specialists often complain that their pitches are queered by unthinking early treatment, but that is not a complaint of their Soviet opposite numbers. Is this at least partly why the Russians get 70% of their wounded back to the firing-line? Another factor may be the toughness of the Russian constitution.

GLOBIN INSULIN

THE attempt to stabilise the diabetic on one dose of insulin a day without producing hypoglycæmia on the one hand or undue glycosuria after meals on the other, has led to the development of a new type of insulin, 'Globin' insulin (with zinc) by the research laboratories of Burroughs Wellcome & Co. (USA). This is a combination of insulin with globin, a simple protein obtained from red blood-cells by removal of the chromogen fraction. It forms a clear aqueous solution at a pH of 3·7 and contains a small proportion of zinc chloride. It is claimed that in rapidity of onset and duration of action it is midway between unmodified (soluble) insulin and protamine zinc insulin (PZI); that in many cases a single injection without the addition of any soluble insulin affords a smooth control of the blood-sugar throughout the day; that a smaller dose is needed than with either soluble or protamine zinc insulin; and that no allergic reactions have been met with. The clinical trials on which these claims are based were made in America. In this country the only observations so far published are by Lawrence,[1] who found in a strictly controlled case that there was little difference between the blood-sugar levels after globin insulin and PZI, although globin insulin came into action more quickly. The maximum effect of both was 15–18 hours after injection, making the night the most likely time for hypoglycæmia. Both the American workers and Lawrence compare globin insulin with PZI and also with unmodified soluble insulin, which is more rapid and stronger in hypoglycæmic action, but do not compare it with delay or retard insulin, Hagedorn's original protamine insulin, whose action is midway between that of PZI and soluble insulin. Retard has indeed been largely superseded by PZI, and entails the rather troublesome addition of buffer substance to each bottle, but it should not be forgotten. Lawrence[2] in 1939 gave the following table, to which may be added the figures of two American workers and of Lawrence himself for globin insulin.

Type	Doses (units)	Duration of action (hr.)	Commonest time for hypoglycæmia (hr.)
Soluble	Up to 10	5–6	2–4
	10–20	6–8	3–5
	20–40	10–12	6–8
Retard	Up to 20	8–10	4–6
	20–40	12–16	6–9
	40–60	Up to 24	7–12
ZPI	Up to 10	6–8	5
	10–20	Up to 12	8–12
	20–30	18–24	8–20
	30–40 +	24 +	16–24
Globin (Duncan & Barnes)	Not stated	18–24	2–8
Globin (Levitt & Schaus)	Not stated	18	8
Globin (Lawrence)	32 (4 days)	24	15–18

So far as can be judged the main advantage of globin insulin is the early onset of hypoglycæmic action—within 2 hours of injection (according to Duncan and Barnes).[3] Levitt and Schaus[4] found that considerably smaller doses were needed in both uncomplicated and complicated diabetes than with either soluble insulin or PZI. Lawrence gave the same number of units of each of the three insulins, and found that globin insulin was no more powerful than PZI. There are two practical disadvantages. The first, pointed out by Lawrence, is that globin insulin is a clear solution indistinguishable

1. Lawrence, R. D. *Brit. med. J.* 1943, ii, 103.
2. *Ibid*, 1939, i, 1077.
3. Duncan, G. G. and Barnes, C. E. *Amer. J. med. Sci.* 1941, **202**, 553.
4. Levitt, A. and Schaus, J. P. *Med. Times N.Y.* June, 1942, p. 187.

in appearance from ordinary soluble insulin, and that patients who are accustomed to opaque slow-acting insulins and to a clear, quick, powerful insulin, are likely to make mistakes. A second minor drawback is that globin insulin is made only in the concentration of 80 units to the c.cm., which is inconvenient except for large doses, 40 units to the c.cm. being the most common strength. In practice a combination of PZI and soluble insulin is satisfactory in the great majority of cases. Retard insulin fills the gap of intermediate action, and is useful for children whose last meal is about 6 PM and also in certain severe cases where the three types given together before breakfast ensure a steady balance all day. The value of this new preparation has yet to be established and carefully controlled clinical trial will be needed before it is used for ambulant diabetics leading ordinary lives.

SEAMEN AND HARDSHIP

> "It is strange, too, that he most strongly enlisted my feelings in behalf of the life of a seaman, when he depicted his more terrible moments of suffering and despair. For the bright side of the painting I had a limited sympathy. My visions were of shipwreck and famine; of death or captivity among barbarian hordes; of a lifetime dragged out in sorrow and tears, upon some grey and desolate rock, in an ocean unapproachable and unknown."

Edgar Allan Poe,[1] writing in 1838, did not include the risks of immersion foot, of blast, shrapnel and bullet injuries, of burns and scalds from bursting boilers. He knew of sharks, but not of the blue-fish, "an animated chopping machine," nor of the barracuda, which will avulse large pieces of muscle and not leave go, though the tail is torn from the head attached to the victim's flesh. In a most instructive, fascinating and rather horrifying little book[2] Critchley has gathered the experiences of shipwreck survivors, and has described the medical consequences of the risks they run. To the sheltered landlubber they have an almost fantastic quality, and one wonders at the courage and hardihood of men, who having gone through such ordeal once will face it a second, a third and a fourth time. The psychological consequences are no less interesting than the purely medical, and offer as many unsolved problems. Anderson[3] has provided a masterly analysis of the mental and emotional changes that take place in the survivors afloat, and has described the mass hallucinations which the mild confusion of exhaustion and the extreme intimacy of communal suffering may produce in the boat's company. It seems that this depth and intensity of suffering comparatively rarely produces nervous breakdown. According to Critchley, the most anxious time for the survivor is when he is on the rescue ship, and a chance submarine may bring him again to within an ace of the death he has so recently escaped. According to Margolin et al.,[4] often enough the men feel worse ashore than at sea; and they report one as saying: "I go home. I say I never go to sea again until the war is over. They make big fuss. My mother, she so good to me I can't stand it. In two days I go back to sea."

From the reports available the problems of neurosis are not quite the same in the Army as in the Navy. In the Navy there is a higher proportion of states of depression, a lower incidence of anxious and hysterical pictures. The differences probably rest on differences of constitutional type in the men attracted to these Services, and in the Navy there are more of the cyclothymic constitution. In the Merchant Navy, the type of man is probably different again, and includes more of the social rebels and the rolling stones which have sought and found an independence and a brotherhood of their own. Margolin and his co-workers note that: "by and large they were small in stature, thin, wiry, gnarled and underfed," and that they were better read than a comparable group of working men, and accustomed to thinking for themselves. Many novelists have commented on the intellectual and often mystical interests of men of the sea. In a psychiatric ward for Merchant Navy men in this country it has been noticed that the esprit de corps was exceptionally strong; and that when it became the right thing to go out and get drunk every night, even the least inclined to do so would feel it necessary to stand by his mates in this assertion of liberty and protest against constituted authority.

To be associated with constitutional differences, racial differences of behaviour have been noticed in the ordeal of shipwreck; but as might be expected these differences are by no means regular or consistent. According to Critchley the Anglo-Saxon usually remains relatively stolid, while coloured races more easily get into a state of despair, and suffer in consequence, he says, a heavy and an early mortality. Margolin et al., however, found that the negroes and Latin Americans of the stewards' department showed a lower incidence of severe neurotic reactions than Anglo-Saxons, Irish and Scandinavians; they were generally better adapted socially, less given to alcoholism, more often married and settled, and had less often had previous nervous disorder. There may be fallacies in both views. Impressions may have been based on an unfair comparison of the behaviour of trained officers with that of the occupants of the fo'c'sle, who represent quite different selections of men; it may well be that a degree of emotional response which would be classed as neurotic in the Anglo-Saxon is normal for the negro. Nor does an excessive response (judged by Anglo-Saxon standards) necessarily imply inability to endure; indeed, it may have the opposite significance, as Guttmann and Mayer-Gross[5] have indicated in their study of the psychology of pain. It is possible that these views could be reconciled, and that whereas the Anglo-Saxon behaves in a more controlled way under circumstances of stress, he is more liable to subsequent anxiety, while persons more outspoken in their emotional response throw off the after-effects more easily.

It is disturbing to read that Margolin and his colleagues found in a representative group of American seamen a critical attitude to the British, and an unfavourable comparison of them with the Russians as hosts. The American "resents the lorry that goes lumbering by without giving him a lift back to his ship, the cool British manner, the failure to provide him with a warm welcome at the end of his trip and the lack of any gesture which would recognise the dangers to which he has been exposed." This is a serious reflection on our hospitality, and one which could surely be remedied.

GALLOP RHYTHM

THE four cardinal signs of impending dissolution in patients with cardiovascular disease—gallop rhythm, pulsus alternans, Cheyne-Stokes respiration and subsultus tendinum—have been recognised for many years, but what we have learnt about their mode of production has taught us that there are exceptions to their ominous significance. Gallop rhythm, for instance, has been subdivided into various types, such as protodiastolic, mesodiastolic, presystolic and systolic; for practical purposes the protodiastolic type is the only one carrying a grim prognosis, and it is this type which the old school of clinicians referred to when they talked of gallop rhythm. Garvin,[6] in an analysis of the records of 790 consecutive adult patients who died of heart disease and on whom necropsy was performed, found 199 cases in which gallop rhythm had been diagnosed clinically. In

1. Poe, E. A. The Narrative of Arthur Gordon Pym of Nantucket, New York, 1838.
2. Critchley, M. Shipwreck Survivors. Churchill, 1943. Pp. 119. 7s. 6d.
3. Anderson, E. W. *J. R. nav. med. Serv.* 1942, **28**, 361.
4. Margolin, S., Kubie, L. S., Kanzer, M. and Stone, L. *War Med.* 1943, **3**, 393.
5. Guttmann, E. and Mayer-Gross, W. *Lancet*, 1943, **i**, 225.
6. Garvin, C. F. *Amer. J. med. Sci.* 1943, **205**, 814.

accordance with current teaching he found hypertensive heart disease and coronary disease to be more commonly accompanied by gallop rhythm than any other form of heart disease, the incidence in the former being 35 and in the latter 31%. Only 7 of his 67 cases of syphilitic heart disease had gallop rhythm, an unexpectedly low figure, for heart-failure with aortic incompetence has always been considered one of the commoner conditions associated with gallop rhythm; the discrepancy may be explained by the fact that he classifies all these cases under the one heading and does not indicate how many of them had aortic regurgitation. Only 12 of the 119 patients who died of rheumatic heart disease had gallop rhythm, while 10 of the 54 who were found to have cor pulmonale showed it. Among the patients who died of hypertensive heart disease the average age at death of those with gallop rhythm was 49·5 years, compared with 58·8 years for those without gallop rhythm. Among the deaths from coronary disease the figures were 57·3 years with gallop rhythm and 64·4 years without. These differences are statistically significant. As was to be expected, there was no evidence of a relationship between sex and gallop rhythm. Unfortunately Garvin does not say how long patients survived after gallop rhythm was recognised, but it is helpful to have his statistical confirmation of old-established teaching.

PHYSIOLOGICAL ACCOMPANIMENTS OF THINKING

ACCORDING to J. B. Watson, it is not true to say that we think with our brain, any more than to say that we walk with our spinal cord. To the physiological psychologist "thinking" is something which accompanies the whole stimulus-response (S-R) mechanism in its various degrees of complexity. When a waiter drops a hot plate, there has been a stimulus affecting the end-organs for heat followed by relaxation of the grip. This has been accompanied subjectively by a feeling of pain followed by a kinæsthetic sensation of muscle movements. These subjective experiences would represent on this view an elementary form of thinking. In the more complicated forms of thought, the S-R mechanism is still there, but in more complex form. On the afferent side, the imagery may be visual, auditory or kinæsthetic in varying degree, while on the efferent side there may be more or less overt movements in the way of gestures, facial expression, visceral tensions, and laryngeal or ocular movements. Studies along these lines have shown that in many people movements of the tongue and larynx, not amounting to speech, are used in thinking. Golla [7] at the Maudsley Hospital investigated by means of a novel apparatus the respiratory changes accompanying the different types of thinking. When visual imagery was employed—and some people use it almost exclusively—breathing was more or less regular, but if there was a tendency to vocalise and to use kinæsthetic imagery it was irregular. This work was implemented by later studies by Spencer Paterson [8] and Wittkower [9] on types of mental imagery and respiration in the psychoses. In this connexion it is of interest that responses to colour and kinæsthetic sensations have been found valuable in Rorschach's tests to distinguish different psychological types. In a new investigation being carried out by Golla, Hutton & Grey Walter [10] at the Burden Neurological Institute, the alpha rhythm in the EEG has been found not to be so "disappointingly constant" as Adrian & Matthews [11] had supposed. This investigation largely depends on an ingenious device described by Grey Walter,[12] in which four tuned reeds are energised by the output from the electroencephalograph. Each reed has a contact wire which dips in and out of a mercury cup as it vibrates; from the frequency of vibration and the time that the contact with the mercury persists the experimenter can analyse the alpha rhythm more delicately. By use of this method, the alpha rhythm has been divided into three types, depending on the hypothesis that the rhythm itself is a sign of inactivity in the visual association areas of the cortex and that activity in that area inhibits it, a supposition for which there is considerable evidence. The first type of rhythm distinguished is extremely small, so that the effect of opening and shutting the eyes could not be traced on the record—the minus or "M" type. In the second type there is a clearly visible rhythm which is present when the eyes are shut, but which is blocked or greatly attenuated either by opening the eyes or by mental exertion of a fairly vigorous type—the "R" or responsive type. The third is an alpha rhythm of similar size which is present at all times, whether the eyes are open or shut and irrespective of the degree of mental activity of the subject—the "P" or persistent type. The crucial test in each case is to see whether the rhythm is different when the subject has his eyes open from what it is when his eyes are shut, and whether it is affected by calculations done with the eyes shut. On the whole the subjects with scarcely perceptible rhythm were those whose imagery was visual, so that no alpha rhythm appeared. Even when the eyes were closed, some visual imagery was still employed. In the "P" type, auditory-kinæsthetic imagery was being used and the visual area inhibited so that the alpha rhythm persisted. Even the stimulus of opening the eyes was not sufficient to interfere with the essentially auditory-kinæsthetic imagery. The "R" group includes those who show alpha rhythm when opening the eyes, and also some who show it when employing visual imagery. Further investigation may greatly modify these tentative findings, yet it is interesting that types of thinking may in time be distinguished not only by studying the sensory areas employed and the peripheral changes such as those of respiration, but also more centrally, by investigating changes in the electric potential of the brain itself.

7. Golla, F. and Antonovitch, S. *Brain*, 1929, **52**, 491.
8. Paterson, A. Spencer, *J. Neurol. Psychopath.* 1934, **14**, 323; 1935, **16**, 36.
9. Wittkower, E. *J. ment. Sci.* 1934, **80**, 692.
10. Golla, F., Hutton, E. L. and Grey Walter, W. *J. ment. Sci.* 1943, **89**, 216.
11. Adrian, E. D. and Matthews, B. H. C. *Brain*, 1934, **57**, 355.
12. Grey Walter W. *J. ment. Sci.* 1943, **89**, 222.

NEW PRINCIPAL OF LONDON UNIVERSITY

Mr. HAROLD CLAUGHTON was educated at Radley and Trinity College, Oxford. On leaving Oxford he went to India as assistant officer in charge of the Imperial Record Department, working under the late Sir Denison Ross, who, in his autobiography, described him even at that time as a remarkable man and a most efficient worker. During the last war, rejected for the army on account of short sight, he was in the Military Intelligence Department from 1915 to 1918. In 1919 he was appointed assistant secretary to the Surplus Government Property Disposal Board, becoming later secretary, which post he held till 1923. In 1929 he was appointed clerk to the newly constituted Court of the University of London. He held this post till 1941 when he was appointed acting principal of the university. He writes admirable English, is a consummate documentary draughtsman and has a dry and somewhat mordant sense of humour, all attributes of value to the chief executive officer of a large and complicated university machine. Though not a medical man Claughton has a wide and sympathetic knowledge of the needs and aspirations of the London medical schools and is very much *persona grata* to the medical members of the senate and to the faculty of medicine generally.

A JOINT conference on the administration of the medical services has been arranged by the Institute of Public Administration and the National Association of Local Government Officers (metropolitan area education committee) and will be held at County Hall, S.E.1, on Saturday and Sunday, Sept. 11 and 12. The speakers will include: Dr. W. Allen Daley, Prof. R. M. F. Picken, Dr. J. A. Scott and Dr. Charles Hill.

Medicine and the Law

"Due Inquiry"

CONCLUSION OF THE SPACKMAN CASE *

THE House of Lords judgments in the Spackman case will rank with *In re La Mert* and *Leeson* v. *General Medical Council* as a classic exposition of the duty of the GMC in respect of the removal of a practitioner's name from the Register. The result may be inconvenient, but, as Lord Atkin observed, "convenience and justice are often not on speaking terms." It is much more inconvenient, he says, that a medical practitioner should be judged guilty of an infamous offence by any other than the statutory body. He does not accept the view that the GMC is ill qualified, by comparison with a judge of the Divorce Court, to form an opinion upon such a matter as a charge of adultery with a patient. "I can imagine no tribunal better qualified to draw deductions from the proved conduct between a doctor and his female patient than the very experienced body of men, for instance, who sat on the present inquiry."

REVIEW OF THE GMC PROCEEDINGS

The facts giving rise to Dr. E. D. Spackman's successful appeal were summarised by the Lord Chancellor with his usual lucidity. Early in 1941 the late Mr. Justice Langton tried the divorce proceedings of Pepper *v.* Pepper (Spackman cited). The original petition was that of the wife who asked that her marriage be dissolved because of her husband's cruelty. Her allegations were supported by the evidence of her medical attendant, Dr. Spackman. On this issue of cruelty Mr. Justice Langton said that he disbelieved Dr. Spackman in toto and he found against the petitioner. The husband, in his answer to the divorce proceedings, alleged that his wife had frequently misconducted herself with the doctor. The judge found that these parties had committed adultery during the years 1936, 1937 and 1938; "this conclusion," he said, "is not, I think, open to any reasonable doubt at all." He therefore granted the husband a decree nisi of divorce with costs against Dr. Spackman and ordered the latter to pay the husband £1000 damages. The decree nisi was made absolute on Aug. 26, 1941. As Lord Wright observed, the damages were paid and there was no appeal.

The GMC subsequently notified Dr. Spackman that it would meet on Nov. 26 to consider the information it had received and to decide whether or no his name should be removed from the Register under section 29 of the Medical Act. The notice made the usual request that any answer, admission or other communication respecting the charge or the defence thereto should be sent to the council 21 days before the day appointed. No written answer arrived but Dr. Spackman attended the council's meetings with his solicitor. The members of the council had been furnished with a shorthand note of the divorce proceedings, including a copy of Sir George Langton's judgment. The solicitor to the council opened the case and produced a certified copy of the decree absolute. Dr. Spackman's solicitor, Mr. O. Hempson, admitted that his client stood in a professional relationship with Mrs. Pepper, but submitted that he should be allowed to call certain evidence not laid before the Divorce Court, with a view to challenging the correctness of the judge's conclusion on the issue of adultery. These fresh witnesses, he intimated, would provide corroboration of Dr. Spackman's denials of misconduct. Mr. Hempson admitted that the proposed new evidence had been available at the hearing of the divorce petition and could with reasonable diligence have been called there; he added that, if he had then been advising Dr. Spackman, he would have called these witnesses in the Divorce Court. The council's legal assessor explained that in such circumstances the Court of Appeal, on an appeal from the High Court, would not consider that there was adequate reason for allowing the further evidence to be called; it was the council's practice, by analogy, only to hear evidence in rebuttal if special grounds existed. Mr. Hempson then addressed the council and called evidence in support of his client's high reputation. After deliberation, the president of the council announced that the facts alleged in the charge had been proved to the council's satisfaction, and directed Dr. Spackman's name to be erased from the Register.

As is well known, section 29 of the act authorises such directions on two grounds—first, on a practitioner's conviction for felony or misdemeanour, and secondly, where "after due inquiry" a practitioner is judged guilty of infamous conduct in any professional respect. The all-important statutory distinction is that the council has to make no further investigation where there is a conviction for crime, but must make "due inquiry" before finding a practitioner guilty of infamous conduct. Was there a "due inquiry" by the council if the council merely accepted the results of the inquiry by the Divorce Court?

HOUSE OF LORDS ANNULS THE ERASURE

Dr. Spackman applied to the King's Bench Division for an order of *certiorari* to annul the direction to erase the name, contending that there had been no "due inquiry." The Lord Chief Justice and Mr. Justice Humphreys (Singleton, J., dissenting) refused to interfere, the Lord Chief Justice saying that he found nothing in the council's proceedings in this case to shock his sense of justice. The Court of Appeal, however, unanimously overruled the court below and adopted the view of Mr. Justice Singleton. Lord Justice Mackinnon held that "due inquiry" involved a full and fair consideration of any evidence that the accused desired to offer, and if he tenders them, hearing his witnesses. An order of *certiorari* was granted but leave was given to appeal to the House of Lords. Now the final appellate tribunal says that due inquiry was not made and that the case must go back to the GMC to take the inquiry up again. "I do not seek in any way," said Lord Wright, "to suggest or forecast how they should hold it; the discretion and responsibility for the procedure are theirs." The Lord Chancellor said it was not disputed that the GMC, in exercising this jurisdiction, was not a judicial body in the ordinary sense; "it is master of its own procedure and is not bound by strict rules of evidence; it is not subject to correction by the courts as long as it complies with section 29 of the Act of 1858." But there was the statutory difference between the conviction of crime, which the practitioner could not challenge, and the issue of infamous conduct on which a mere acceptance of the adverse finding of the Divorce Court would not be "due inquiry" if the council refused to hear evidence tendered to establish that the Divorce Court's finding was wrong. The problem, said Lord Simon, does not arise only over divorce proceedings. A jury's verdict of justification in a slander action, judgment for the plaintiff in an action for seduction, a bastardy order made by magistrates—these and other proceedings in a court of law might lead to a charge of infamous conduct before the council. The council might treat the courts' conclusions as prima-facie proof, but must, when making "due inquiry," permit the doctor to challenge the correctness of the conclusions and to call evidence in support of his contention. "The previous decision is not between the same parties: there is no question of *estoppel* or *res judicata*: in such cases the decision of the courts may provide the council with adequate material for its own conclusion if the facts are not challenged before it, but, if they are, the council should hear the challenge and give such weight to it as the council thinks fit." In divorce proceedings the decree "provides a strong prima-facie case which throws a heavy burden on him who seeks to deny the charge, but the charge is not irrebuttable." In weighing the value of rebutting evidence produced before it, the council is entitled to bear in mind that it is not given on oath and that the council cannot compel the attendance of other witnesses which might refute it. "It is further entitled to attach to the conclusion of the Divorce Court all the weight that is due to the effect upon a trained judicial specialist of sworn testimony given, subject to cross-examination, before a tribunal which can compel attendance of witnesses and production of documents." But all this does not exonerate the council from refusing to allow the accused to put before it relevant matter in support of his denial. "If it was considered desirable to make the

* Dr. Spackman's successful appeal was undertaken by the Medical Defence Union.

decision of the Divorce Court conclusive, and so to prevent the possibility of a second hearing on the issue of adultery, this could only be brought about by amending section 29." Both Lord Simon and Lord Wright drew attention to the different language of Parliament in the Clergy Discipline Act of 1894 where a mere finding of misconduct against a clergyman in a law-court is a ground for removing him from his post without any further inquiry.

OTHER POINTS IN THE JUDGMENT

The speeches of other learned lords referred to other matters of interest. Lord Atkin emphasised that, if a Divorce Court finding is "prima-facie evidence" of infamous conduct, the very conception of prima-facie evidence involved the opportunity of controverting it. Lord Atkin made a novel point by doubting whether it is true that the GMC have no power to administer an oath. "This proposition, which is found in other cases and in the judgments of the Court of Appeal in the present case, appears to ignore the provisions of Lord Brougham's Evidence Act (14 & 15 Vict. c. 91. s. 16)." Lord Atkin also remarked that the extracts from the shorthand notes of the divorce proceedings did not contain any evidence at all of adultery but related to the absence of doubt in the mind of the Divorce Court judge. "But the question does not turn upon the Judge's absence of doubt, but upon whether the members of the Medical Council are themselves convinced of their fellow-practitioner's guilt."

At least two of the Lords of Appeal commented on the omission by the GMC to observe the practice enshrined in its own rules. Rule 9 in chapter XIV provides that, if there is no complainant (as in the Spackman case) before the council, the council's solicitor will state the facts and produce the evidence so far as the case is not admitted, and the practitioner will then be called upon by the president to state his case and to produce the evidence in support of it. To produce the evidence in support of his case was just what Dr. Spackman had been prevented from doing. Lord Wright threw out a hint that the rules can be changed. Rule 9, as it stood, satisfied, he thought, the essential requirements of justice and fair play. There was no analogy between the practice of the council and the practice of the Court of Appeal where the calling of fresh evidence is discouraged out of respect to the maxim *ut sit finis litium*—i.e., that litigation shall not go on for ever. Earlier in his speech Lord Wright had commented on the nature of the GMC's jurisdiction. "It has not merely to ascertain the facts but to decide what standard to apply"; it has to say whether the particular conduct is infamous "not in the abstract but 'in any professional respect.'" There is, he recalled, no appeal from the council's decision, but his language lent no support to those who sometimes belittle the council's jurisdiction, authority and standards.

"Such tremendous powers, which may close a man's professional career and ruin him financially and socially, have been vested in the Council by Parliament from a faith both in the members' expertness in regard to that grave issue and to their moral gravity and trustworthiness—such is the eminence of the Council, and so completely representative is it of a great profession, the honour and integrity of which are of the highest importance as matters of public policy."

Charge of Rape against Doctor

The jury at Birmingham assizes failed to agree at the trial of Mr. K. M. Pardhy, FRCS, aged 68, who was charged with the rape of Mrs. Pearson when she visited his consulting-room on June 10 for a medical examination. The object of the visit was to ascertain if she was pregnant. Her husband went with her and sat behind a screen in the room. Suddenly Mrs. Pearson shouted out "John" to her husband; he came round the screen and told the accused that he had never examined his wife. The accused replied "Yes, I have; your wife is not pregnant; she is neurotic." Mrs. Pearson asked her husband to take her away. The accused denied the offence. The prosecution called medical evidence to prove that a proper examination would perfectly easily have disclosed that Mrs. Pearson was pregnant. The defence called Prof. L. P. Gamgee, FRCS, of Birmingham University, who gave his opinion, based on physiology, that the offence would have been impossible, judging from the evidence given as to the position of the complainant and the accused at the time.

Mr. Justice Wrottesley, in his summing up, emphasised the importance of the case to the parties and to the public in view of the relationship between doctors and women patients. Reviewing the evidence, he emphasised that the issue depended largely on Mrs. Pearson's testimony. Only three persons knew what went on in the room. Of those three only one could really say what occurred; Mrs. Pearson was placed in such a position that she could not see what was going on; Mr. Pearson sat with his back to a screen. In his cross-examination of Mrs. Pearson, Mr. G. D. Roberts, K.C., attacked her character. She admitted that a neighbour had complained about her conduct with the neighbour's husband, but she added that there was no ground of complaint. She admitted that she had reported to the police a man who came to look over the house, followed her into the kitchen, pushed her on to a chair and kissed her. A man was brought into court in custody of a warder. Mr. Roberts asked her if she knew the man and if she had once slept a night with him. She replied that she had never seen the man before. As the judge was careful to explain to the jury, such a question is permitted in cross-examination; it cannot be excluded as irrelevant; it might go to establish that the witness was a loose woman. "At the same time our law is quite definite in this; if the witness denies the allegation, the answer must be taken as final."

Detailing the defendant's evidence of what happened in the consulting-room, the judge commented that if it were true, it was an end of the case and he must be found "not guilty"; if there were anything in the story of Mr. and Mrs. Pearson which shook their faith, the jury must acquit him. "You may find it impossible to believe it; that is for you." The case bristled with improbabilities; "perhaps the most improbable thing of all is that Mrs. Pearson suddenly thinks there is something wrong when there is not, suddenly sits up and calls out 'John,' and then there follows the scene which the accused described when in fact he had done nothing."

The jury returned to court after an absence of 1½ hours, the foreman stating that they could not agree. After further observations from the judge they returned again, still unable to agree. The case stands over for re-trial at the assizes in December.

Changed Death Certificate

During an inquest at Warwick at the end of July the coroner invited and obtained from the jury a criticism of the conduct of the Leamington registrar of births and deaths who had asked a doctor to alter a death certificate.

The deceased, Mrs. Lewis, was admitted to the Warneford Hospital on Dec. 20 last after, it was said, an incomplete abortion. In his summing-up the coroner observed that there seemed no doubt that Mrs. Lewis procured the abortion herself by means of a syringe. An operation was performed at the hospital, but the patient died on Jan. 2. The body was exhumed from Warwick cemetery.

Dr. Agnes K. Leslie of the Warneford Hospital gave evidence that she issued a death certificate giving the cause of death as pelvic cellulitis and septic abortion. Mr. Reginald Wilkins, the registrar, she said, telephoned to her the same evening, asking if she would mind not using the word "abortion"; if she would use the word "miscarriage" instead, he would not have to inform the police and the trouble of an inquest would be avoided. The registrar's evidence was that, on receiving the certificate, he telephoned to ask if the abortion was a natural one or one induced by artificial means. Dr. Leslie told the coroner that she refused to alter her certificate but said she would consult a medical colleague. Dr. J. J. B. Sebastian, senior resident surgical officer at the hospital, testified that Dr. Leslie consulted him on the point: he advised her not to alter her certificate, but he suggested she should consult Mr. E. G. Dingley, FRCSE, hon. surgeon to the hospital, who had been treating Mrs. Lewis privately. Dr. Leslie explained the position to Mr. Dingley, who disagreed with the certificate; he considered the cause of death to be uræmia and miscarriage. Dr. Leslie thereupon sent a note to the registrar, saying that Mr. Dingley, whose private patient

Mrs. Lewis had been, wished the cause of death to be given as uræmia and miscarriage and that a second certificate, worded accordingly, was being sent. Mr. Dingley told the coroner that he accepted responsibility for the altered certificate; he was of opinion that death was due to uræmia arising from a blood transfusion. Mr. J. M. Webster, FRCSE, director of the West Midland Forensic Laboratory, testified that he was present at the exhumation and that he made a post-mortem examination. In his opinion the first certificate, attributing death to pelvic cellulitis and septic abortion, was wrong; death, he considered, was due to uræmia, anuria following on blood transfusion, and abortion.

Mr. Dingley stated at the inquest that the medical profession felt very strongly that it was not their duty to report deaths to the coroner. By his questions and in his summing-up the Warwick coroner naturally and properly showed himself anxious to clear up any suggestion of an underlying motive on someone's part to prevent the matter becoming known to the coroner. The jury might, he said, come to the conclusion that the registrar's conduct was highly improper. "You may think it is to be regretted that Dr. Leslie did not stand her ground and refuse to withdraw her first certificate; I must confess I do not quite understand why Mr. Dingley countenanced it." In returning a verdict that death was due to uræmia and abortion self-induced, the jury added a rider that the registrar exceeded his duty in communicating with Dr. Leslie. Indeed, as the coroner had remarked, "If Mr. Wilkins's conduct was correct, you may wonder why the office of coroner is still retained in this country."

Special Articles

COMPREHENSIVE MEDICAL SERVICE

REPRESENTATIVE COMMITTEE'S SUGGESTIONS

THE discussions between the Minister of Health and the committee representing the medical profession on the establishment of a comprehensive health and rehabilitation service have now ended, and a white-paper surveying the position is expected shortly. The purpose of the Representative Committee was to explore, with the Minister or his officials, the medical problems raised by Assumption B of the Beveridge report and to put forward the views which they believed to be those of the majority of the profession. It had no power to commit the profession in any way. The committee (RC for short) has been guided by the British Medical Association's *General Medical Service for the Nation* (1930, revised 1938) and the draft interim report of the Medical Planning Commission (June 1942) viewed in the light of criticisms made by constituents of the commission and others.

The white-paper will also not commit the medical profession, and the RC has urged on the Minister that it should be confined to a statement of the problems and not commit the Government to any one solution of them. This would facilitate free discussion by the public and by doctors and other affected groups. The committee has reached the conclusion that there should be an early agreement by the profession on the fundamental principles which would form the basis of any future reorganisation of health services whatever the contents of the white-paper. It has therefore prepared the following statement for consideration by its constituent bodies.

THE ELEVEN PRINCIPLES

(1) The health of the people depends primarily upon the social and environmental conditions under which they live and work, upon security against fear and want, upon nutritional standards, upon educational facilities, and upon the facilities for exercise and leisure.

(2) The efficiency of a country's medical services, both preventive and curative, depends upon the available medical and scientific knowledge, upon the character and extent of medical education, and upon the absence of any economic barriers that impede the utilisation of such services. Thus, in order to improve the country's medical services, the facilities and resources for medical research should be greatly increased; medical education, both undergraduate and postgraduate, should be maintained on a higher standard and be adapted to modern needs; the facilities for postgraduate medical education should be greatly increased; and, wherever economic barriers prevent an individual taking advantage of medical services, such barriers should be removed.

(3) Subject to these general and overriding considerations, the functions of the state should be to coördinate existing provision, both official and non-official, to augment it where necessary, and to secure that it is available without economic barrier to all who need it. The state should confine itself within these wide limits, invading the personal freedom of both citizen and doctor only to the extent which the satisfaction of these functions demands.

(4) The state, while assuming responsibility for the organisation and provision of medical services, should not assume control of doctors rendering individual or personal-health service. It is not in the public interest that the state should convert the medical profession into a salaried branch of central or local government.

(5) Free choice of doctor should be preserved as a basic principle of future health services, and no administrative structure should be approved which does not both permit and encourage such free choice.

(6) It is not in the public interest that the state should invade the doctor-patient relationship. The loyalty and obligation of a doctor rendering personal health service to an individual patient should be to that patient and to none other. This presupposes that, in so far as the doctor is employed, he should be employed by the patient, to whom his responsibility will lie.

(7) The ideal doctor-patient relationship can continue to exist only where that free choice of doctor is reinforced by a method of remuneration of doctors which is based on the number of persons or families selecting a doctor, or related to the items of service rendered.

(8) Every member of the community, whether entitled to avail himself of any official health service or not, should be free, if he so chooses, to utilise the services of the doctor of his choice, whether that doctor is a member of the official service or not. Nothing should be done to encourage the splitting of the medical profession into two groups, the official doctors and the non-official doctors.

(9) The work of consultants and specialists should be based on the hospital. Private consultant practice should continue in private wards for those persons who prefer to go into those wards.

(10) The central administrative structure set up by the state for the central administration of the medical service in the future should be a body concerned only with civilian health services, but it should be responsible for all civilian health services administered by central government. The minister to whom this central administrative body is responsible should be advised on medical matters, including personnel, by a medical advisory committee, representative of the medical profession. Locally, new administrative bodies, responsible to the central authority, should cover wide areas and should be representative, directly or indirectly, of the community served, and, in appropriate numbers, of the local medical profession and voluntary hospitals. They should be advised on medical matters, including personnel, by local medical advisory committees representative of the local medical profession. These administrative changes should be regarded as foundation changes to be completed before other changes are initiated.

(11) All branches of medical practice should be regarded as a single service, and it is undesirable that a detailed scheme for general practitioners should be framed and put into operation without corresponding arrangements for other branches of practice.

In submitting these eleven principles to its constituents the RC suggests that, pending the consideration and completion of the foundation administrative changes mentioned in section (10), Assumption B should be satisfied by an extension of National Health Insurance to include dependants of insured persons and others of like economic status, and to cover consultant and

specialist services and laboratory and hospital facilities as well as general practitioner service. Those with incomes above the existing limits could, if Parliament decides to make the service available to every member of the community, be permitted to become voluntary contributors to the extended service. The committee also advocates organised experiments in group practice, including health centres of different kinds, on the results of which future developments in group practice would depend.

CANADA

CANADA is a large country and a peripatetic correspondent could doubtless find interesting material for a letter in a dozen places, but travel is restricted, taxation is high and Victory loans are called for once a year, so the letter-writer must sit like Montaigne in his tower and deal with matters as he sees them.

* * *

The Canadian Medical Association held its annual meeting in Montreal on June 15. No scientific sessions were held and the attendance was limited to the council. The chief item of business was a discussion of the Health Insurance Bill now before the Parliament of Canada. It is still impossible to be definite about the provisions of this bill as it affects the medical profession. The measure is still in the discussion stage and modifications of the original draft are being made from time to time.

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The Canadian Association of Clinical Surgeons, which has been in existence for 35 years, has a limited membership drawn from the departments of surgery in the universities of Manitoba, Ontario and Quebec. Normally two sessions are held each year. The regular programme is three half days in as many hospitals and a dinner in the evening of the first day at which the business of the association is done. On June 4 and 5 the meeting was held in Toronto. The staffs of the Toronto General Hospital, the Hospital for Sick Children and the Christie Street Hospital of the Federal Department of Pensions and National Health provided the material for discussion. Dr. R. I. Harris demonstrated the use of the Stader splint which was first shown in Toronto by the inventor and Surgeon-Commander Kresz of the United States Navy about a month ago. The chief subject for discussion at the dinner meeting was the certification of specialists under the proposed national health insurance scheme which is now before Parliament. It was agreed that the Royal College of Physicians and Surgeons of Canada should be charged with this duty. This body may find it necessary to admit a number of general practitioners to membership and have its charter amended accordingly. As now constituted, the fellowship is the only award granted by the college, but it is physically impossible to staff the hospitals outside the larger cities with fully trained surgeons who hold diplomas from one of the royal colleges of surgeons. A difficulty arises as to what the new class should be called. Canada is bilingual in all matters of state and there seems to be no way of translating the word "fellow" into French. French-speaking fellows call themselves "members" and are so designated in the records as written in the French language. In the Province of Alberta the certification of specialists is a function of the senate of the provincial university. Such an arrangement would be impossible elsewhere, with the exception of Manitoba.

* * *

Sister Kenny visited Toronto early in June at the invitation of the minister of health in the Ontario government. She gave a large audience in Convocation Hall, University of Toronto, an exposition of her method of treating cases of acute poliomyelitis. Hamilton, Ont., has nurses trained in the Kenny School in Minneapolis, USA, but the staff of the Toronto Hospital for Sick Children are not yet convinced. Their success in rehabilitating victims of the epidemic of 1936 has made them cautious in accepting radical changes in treatment. You will recall that Cromwell before the Presbyterian Assembly in Edinburgh, said, "I beseech the brethren . . . that ye consider whether ye may be wrong." Perhaps the same might be said to Sister Kenny—and to the exponents of the more established systems.

In England Now

A Running Commentary by Peripatetic Correspondents

THE core shop of a foundry is not a pleasant place. Dirt and fumes and temperature combine to make it particularly undesirable on a warm summer afternoon. On such a day I was hurrying through such a core shop as fast as decency would permit when one of the workers asked me how I would like to work there. I had no hesitation in replying that I should hate to work there; and his comment was that the firm paid them "dirt money," but that it was really dear money because it cost him three or four pints of beer to slake his thirst before he went home of an evening. There must be many men (and women in these days) who qualify for dirt money. Sometimes they get it, sometimes not. Much depends on the tradition of the job: in some the dirtiest jobs go as a matter of course to the least skilled—and lowest paid—workers, sometimes to the most recent recruits, and the question of extra pay does not arise. It may be that the circumstance calling for extra pay is not so much dirt as danger. If an occupation is specially dangerous it should carry special remuneration —"danger money"—but, as Sir William Beveridge says in his report, to give danger money only in the form of higher wages, that is to say, only as long as no accident has occurred, is of little value, for it does not ensure that more money is available when alone it is needed, that is, when the danger has resulted in an accident.

The attitude of workmen to danger money and dirt money varies. Some of them need or want the money so badly as to be willing to undertake almost any work that carries extra pay. Their attitude to overtime is often similar. The majority prefer to be without either danger money, dirt money or overtime wages if they can get along without; a few seem to have a genuine desire to live dangerously; and—more remarkable—a small number seem to revel in dirt for dirt's sake; which after all is not far removed from the experience of the everyday world. Robert Louis Stevenson, like many writers before him, knew that in unloved toils, even under the prick of necessity, no man is continually sedulous: he wrote that "Of those who are found wholly indefatigable in business, some are misers; some are the practisers of delightful industries like gardening; some are students, artists, inventors or discoverers, men lured forward by successive hopes, and the rest are those who live by games of skill or hazard."

A good deal can be done to reduce the amount of dirty and dangerous work. There is a whole code of factory law directed more or less expressly to that end and there is no reason why, with improving methods (e.g., of foundry construction and technique), much further improvement should not be secured. Even then there will remain a certain amount of undesirable work and the question may come to be whether it is indeed necessary or justifiable to ask human beings to undertake it. If the answer is yes, then the work will have to be made as little unattractive as possible not merely through better wages and compensation provision but also by amelioration of working and living conditions, as by insisting on adequate ventilation, washing facilities and the like. It seems probable that remedial action of this kind will in any case be forced on industry, for only so will the less desirable industries—among which coal-mining stands out a mile—be able to recruit labour of quality in the days when direction is no more. It is idle to say that a considerable section of the people does not want amenity and will not appreciate it. Dirt money will not always mean simply the wherewithal to buy an extra pint on the way home; the experience of pithead baths, where the percentage of men using them has risen from about 70 to 90 within the last twenty years, is a clear pointer to what can be done.

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Those who know about them tell me that the Chinese have much in common with us. We certainly share a similar taste in humour and a common sympathy for patient Griseldas if *Lady Precious Stream* is a fair sample of the Chinese fairy story. Seeing it played in the open air without décor but in the most magnificent costume brought home to me once more the relative unimportance of the one (which may be merely distracting) and the

theatrical value of the other (which serves only to focus attention on the players themselves). Turghenev's comedy of manners, *A Month in the Country*, provides abundant evidence, if such were necessary, of Mr. Emlyn Williams's capabilities as a producer. Good as the players are they could scarcely be so good without much patient and sensitive direction. Hedonists of both sexes and all ages—and their name is Legion just now—would do well to see this admirable play if only to learn how the mad bull of physical passion can be successfully steered out of the China shop of decent family life by civilised and self-disciplined persons who don't lose their heads.

* * *

As soon as you join the Bright Boys of pseudoscientific medicine you have to play their game of space-pinching in the *Medical Directory*. It is a fine healthy game, now at the height of its season, and consists in acquiring as much print after your name as you can in spite of the publisher's rules designed to frustrate your efforts. Scoring is by printer's "ems," partly to make it more difficult and partly to reduce the start of those with long and multiple names. For this em is, I gather, the width of the capital letter M in whatever size type you are using, so that a surname which takes up half a line of capitals scores no more than an appointment which fills the same space (why not just score by the inch? I dunno). The number and length of your addresses and telephone numbers are partly a matter of luck and partly of investment (as in "Monopoly"); but degrees should be taken separately, each in a different year, otherwise the publishers will lump them all together. Places of education were, of course, dealt you before the game began. During your postgraduate career it is useless to collect more than three house-appointments. Mr. Churchill (J. and/or A.; not W) is firm; he will only print three. Present appointments (of which again only three are mentionable) should be measured carefully with a ruler before acceptance. Even then they may prove disappointing when abbreviated. There is, however, one absolute winner—"Phys. i/c Radio-therap. and Electr. Dept. St. Yuknow's Hosp." (29 ems, I think). But the worst pitfalls of abbreviation are presented by the (three only) learned societies. For instance, you pay three guineas a year to become a member of the British Medical Association (13 ems), and are fobbed off with "Mem. B.M.A." (7 ems). I can on request furnish you with the entrance form of a very jolly "Fell. County and Town Med.-Chir. Soc." (18 ems), which will only cost a guinea a year. Only three learned papers are allowed; but this is where we really spread ourselves. We don't write about *Sunlight for Rabbites*. No, we devise a fine fumbling rigmarole, such as *Some Observations on the Effects of Heliotherapy in Cases of Punctured Wounds caused by Rodents*," and score dozens of ems. Having invented this grand title, we shall have to write a turgid article to live up to it, which is a pity, because we may have something worth saying. Worse still, we may not.

Years ago when I was in general practice, the ear, nose, and throat surgeon at the county hospital rang me up one evening and asked if I would mind applying for the post of clinical assistant to his department. When I expostulated that (*a*) I had never seen beyond the tonsils in my life, and (*b*) couldn't attend the sessions, he replied that that was just the point. He wanted to dislodge his present clinical assistant, who was always getting in his way and breathing down his neck, and he longed to run his department in peace. My appointment was, in fact, conditional on my never showing my silly face in the department at all. I naturally accepted the office, and performed my duties to the satisfaction of all. I was unremitting in my non-attendance, and never took a holiday. Soon afterwards I left general practice, and later moved to the other side of England; but I never considered resigning my post. Up to now I have kept this pretty dark, but competition is so keen these days that I cannot allow good ems to run to waste. The only question is, how best to put it? "Late Clin. Ass. to E.N.T. Dept." would be an understatement and rather misleading; I was better than late. Perhaps the most satisfactory modification would be that one they put on odd roads in new housing estates—"Clin. Ass. Ear, Nose and Throat Dept. (Not Adopted)." That will be 24 ems.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

DURING the last few days of the session the House discussed woman-power, supplementary pensions, draft regulations for unemployment assistance and a string of other matters raised by private members on the day of adjournment. The feeling and atmosphere of the House has been dominated by the grand news from the war fronts, but there has been some effervescence of irritation here and there. Mr. Brendan Bracken, Minister of Information, introduced a new note by suggesting that if anyone believed any of Ribbentrop's "fizzy rubbish" he should be sent not to a mental specialist but to a veterinary surgeon. This view suggests a greatly increased scope for the work of the veterinary profession in the immediate postwar world.

On the first sitting day woman-power was discussed on the basis of equal pay for equal work and woman's part in the war effort. As the result of opinions expressed in the House and outside it has now been decided to debate the call-up of the older group of women from 47 to 50 when the House reassembles and this will apply also to the proposal to conscript boys up to 18 for work in the mines. During the debate General Sir George Jeffreys put the case for maintaining the status quo of the VAD organisation as against accepting the recommendations of the Elliot Committee's report. The Minister of War replying reaffirmed the Government's decision to accept the report and said he was sure that the new system would prove successful in making still more effective the work of the VADs. The fact that the Navy and the Air Force are not coming into line falls into its proper perspective when the numbers involved are realised. The Army employs 4500 VADs, the Navy less than 1500 and the Air Force less than 300. The criticism levelled against the abolition of the VAD commandant also loses effect when it is known that there are only 24 in the whole country. Sir Edward Grigg has promised to do all he can to facilitate the transition from the old to the new conditions.

Replying to the debate as a whole Sir William Jowitt said that the rate of sickness and discharge in the women's services has been greater than in the men's—and this apart from cases affected by pregnancy. This higher rate is perhaps partly due to insufficient examination of candidates on entry and it may lead to a larger proportion of pension claims than in the men's services of comparable employments. The rate of pensions, both the basic rate of 10*s.* a week and the supplementary rates which have recently been increased by 2*s.* 6*d.* a week, is still a running sore in Parliamentary debate. Mr. Tinker was among the members of all parties who put forward a claim for an increase of supplementary rates to £1 a week after payment of rent. The House is uneasy at the idea of the retired workers of the community being paid at a rate on which it is a struggle to live under present conditions.

FROM THE PRESS GALLERY

The Art of Teaching

IN a teacher's postcript to the debate in the Lords on the white-paper on education, Lord MORAN said that for twenty-five years he had been dean of a London medical school. Every year there came to that school 60 or 70 new students, and for the next five, six or seven years he watched them using the education they had already been given, applying it to the new task of becoming a doctor. The results on the whole were disconcerting. Many of the boys lacked reasoning power, and many were without curiosity. A student without curiosity, Lord Moran affirmed, was not a student at all. He agreed with what was said in the white-paper about the importance of the teacher, and it seemed to him that all they were doing would come to nothing unless they could find teachers of quality, for the teaching art was important and difficult. In the education of the medical student, for instance, they kept adding to the curriculum; they never took away. They asked the student to memorise a mass of facts, instead of teaching him how to handle them. Before

they sent the student away they so contrived to educate him that he could not educate himself. He had no power of growth. Lord Moran had come to ask not how much a man knew when he qualified, but whether he wanted to learn, and if he knew how. It was easy to ask a boy a question and decide whether he knew the facts; it was more difficult to shape a question so as to make him think for himself. The great thing needed was to find out during the war which were the men whom they wished to recruit for the teaching profession.

It was commonly said that the stern fervour of these times of war changed men so that soldiers were made out of indifferent material. He did not believe that was true. War had no power to transform; it only unmasked and left men as they were themselves. The people with the battalions now on active service knew which were the men of character. Was it not a pity that we should not have some record of these men? Otherwise when demobilisation took place the just and the unjust would be thrown on the labour market together with nothing to distinguish them.

The relation between teacher and pupil was everything. Lord Moran was once asked what qualities in a man made a successful dean of a medical school, and he had answered: "If he is a sort of man who goes to see the fifth team play football on a muddy field in a downpour of rain and likes doing it, so that at the end of the game the players come to him and talk to him as one of themselves, then all other things will be given unto him." If we were to get this comradeship between teacher and pupil we must remember that you could talk to a class, but you could only teach boys and girls whom you knew. Public schools had another advantage besides moulding character which had been lost sight of. They brought together the pupil and the teacher after the day's work was done. This was brought home to Lord Moran in the early part of the war. Usually the physicians and surgeons attached to London teaching hospitals visited them three or four times a week, but when their students were scattered among half a dozen hospitals outside London, two or three of these teachers went to live and mix with groups of 30 students or so. As to the content of education, Lord Moran agreed with the parent who said that he did not mind what his boy was taught as long as he was well taught. At the Renaissance men became aware of the beauty all around them, felt a desire to instil this love of beauty into others, and used the classics for this purpose. Even now we would not quarrel with that, but science, the business of the stars, and things of that kind, interested the average boy more than any other subject. Science, it had been said by a member of their Lordships' House, was organised curiosity, and was it not the alpha and omega of teaching to arouse and inspire curiosity and hold the attention of the boy? He therefore welcomed the extension of residential schools in England so that more might profit from them.

QUESTION TIME

White-paper on Health Services

Captain PETER MACDONALD asked the Minister of Health when he proposed to issue his white-paper containing his preliminary proposals for implementing the health scheme of the Beveridge report; to what extent this would affect interests other than the medical profession; and whether he would give an assurance that these interests, such as the hospitals, dentists, pharmacists, optical practitioners and others had been accorded the same facilities for consultation with his department as representatives of the doctors.—Miss F. HORSBRUGH replied: The Minister hopes it will be possible to publish a white-paper about the time when the House reassembles. This would then serve as a focus for full discussion by all concerned, including many interests besides the medical profession, and it has always been the Minister's clear intention to give ample opportunity for this.

Supply of Nurses and Midwives

Sir RALPH GLYN asked the Minister of Labour whether he was in a position to make a statement regarding the supply of trained nurses and midwives as a result of the registration recently carried out by his department.—Mr. MALCOLM MCCORQUODALE replied: Just over 400,000 persons have registered under the Nurses and Midwives (Registration for Employment) Order, 1943. Of these approximately 270,000 were engaged at the time of registration in some form of nursing or midwifery work. About 130,000 were not engaged in such work, and it is expected that most of these, on account of age, family responsibilities or for some other reason, will prove not to be available to return to the nursing or midwifery services. Interviewing both of persons registered recently and of those who came forward in response to the recent publicity appeal began at the appointments offices of the department in June and during June and July nearly 2000 nursing and midwifery vacancies have been filled.

Accommodation for Unmarried Mothers

Dr. H. BROOKE asked the Minister whether he was aware of the present acute deficiency of antenatal and postnatal accommodation for unmarried mothers; and whether he had plans on an adequate scale for remedying this, either by financial assistance to voluntary organisations willing to establish hostels, or otherwise.—Mr. BROWN replied: I have made special arrangements to provide for certain classes of case transferred by the Government away from their own homes. Assistance to voluntary organisations can be given by welfare authorities, with whom I intend to communicate on this matter in the light of recommendations made by my advisory committee, to whom I referred this question for special consideration.

Tuberculosis in Scotland

Mr. H. MCNEIL asked the Secretary of State for Scotland how many acute tuberculous patients were waiting for hospital accommodation on July 1, 1943; and how many additional beds had been made available for such patients between May 1 and July 1, 1943.—Mr. T. JOHNSTON replied: At July 1, 1943, the number of pulmonary tuberculous patients who had been waiting for hospital accommodation for ten days or more was 1007. As regards the second part of the question, precise figures are not readily available for the dates mentioned, but between the beginning of April and the beginning of August 244 new beds have been occupied, and nursing staff has been obtained for 65 additional beds which had not been in use owing to lack of staff. A further 130 beds are ready for occupation as soon as nursing staff can be obtained, and a still further 330 new beds will be available immediately certain adaptations are completed, provided nursing and domestic staff is available. Proposals to cover the remainder of the waiting-list by release of further emergency hospital service beds are being urgently examined.

Mr. MCNEIL: Were these 244 beds included in the 300 which the Minister promised when making his annual report, or are they additional to the 300?—Mr. JOHNSTON: Some are included, but between the beginning of April and the beginning of August 244 beds were made available.

Miniature X-ray Sets

Mr. G. MUFF asked the Minister of Supply whether he would speed up production of the miniature X-ray apparatus needed for the diagnosis of tuberculosis; and how many of these machines had been handed over to the Ministry of Health in the past three months.—Mr. CHARLES PEAT replied: Production is being speeded up as much as possible, having regard to the demands for X-ray apparatus for war purposes. Four sets have been delivered to the Ministry of Health within the past three months, and three more are expected to be delivered very shortly.

Status of Physiotherapists in the Army

Major Sir JOCELYN LUCAS asked the Secretary of State for War if, in view of the fact that allied and Dominion nurses and physiotherapists were given officer's status, while British physiotherapists were given a lower rank, thus causing dissatisfaction and a drift to other branches, he would take action to remove this inequality.—Sir JAMES GRIGG replied: The Financial Secretary received a deputation of physiotherapists last week. Their representations are now being considered.

Accommodation for Hop-pickers

Mr. W. J. THORNE asked the Minister of Health how many of his inspectors visited and inspected hop-pickers' huts and camps.—Miss HORSBRUGH replied: The primary responsibility for the inspection of hop-pickers' camps rests with the sanitary authorities of the districts concerned. Before the outbreak of war two medical officers of the ministry were engaged on this work throughout the hop-picking season. Under war conditions this close supervision is not possible but in each civil defence region concerned, one of the ministry's regional medical officers visits the camp areas for some days in each season and as far as practicable keeps in touch with conditions.

Letters to the Editor

THE ELEVEN PRINCIPLES

SIR,—The report of the Representative Committee to its constituent bodies should receive our warmest support. I suggest three points of importance in its "General Principles" calling for amendment.

(1) Surely "The health of the people depends primarily" on their will, as well as their opportunity, to help themselves. There is far too much talk of what the community must do for the individual, as compared with what the individual can and should do for himself. The words ". . . and upon the will of the people to help themselves" should be added.

(10) Is "the central administrative structure . . . concerned only with civilian health services" to be a Ministry of Health, stripped of its responsibility for local government and housing? If so, local authorities will look to other departments for guidance; and health will again become the Cinderella of local government. Why not call this central administration the Ministry of Health and strengthen it as suggested in the report? "Locally, new administrative bodies . . . should be representative . . . in appropriate numbers, of the local medical profession. . . ." Are these bodies to supplant the county and county borough councils and the local sanitary authorities? If so, they must be elected by public vote and will not be representative of the local medical profession. If not, they will not have the power of the local authority, its officers and its purse; they will be yet another extra body to complicate and delay matters. Local government cannot be split up between health matters and others. The expected reform of local government will, it is hoped, provide bodies, elected by the people and directly responsible to them, who will be more and more influenced by the other "local medical advisory committees," rightly proposed in this report.

The more medical men in local, as in national, government the better. But do not let us tinker with the democratic system, however faulty, of elective government, local or national, giving the people the doctoring they want, in favour of a corporative exception, redolent of Mussolini.

Hatfield, Herts. FRANCIS FREMANTLE.

SULPHONAMIDE RESISTANCE

SIR,—In your leader of July 10 the statement is made that "an organism which has become resistant to one sulphonamide is correspondingly resistant to all the others." Two years ago I had arrived at a similar conclusion,[1] but I recognised that further investigation was necessary. From this further investigation it now seems that my earlier conclusion was incorrect.

Seven strains of hæmolytic streptococci which were resistant to sulphanilamide were tested by the ditch-plate method (Fleming,[2] Colebrook & Francis[1]) against four sulphonamides as shown in the following table. The figures indicate the width of the zone in which the growth was suppressed by the different compounds (millimetres):—

Strep. strain and type	Inhibition (mm.) on ditch-plate by			
	Sulphanilamide 20 mg./100 c.cm.	S-pyridine 10 mg./100 c.cm.	S-diazine 5 mg./100 c.cm.	S-thiazole 2·5 mg./100 c.cm.
Symington	0	6	0	17
Sullivan	0	12	0	18
Rooney	0	0	0	16
Brennan	0	15	12	26
Main	0	5	6	20
Palmer	0	0	0	0
Rackstraw *	17	16	15	22

* Sensitive control.

1. Colebrook, L. and Francis, A. E. *J. Path. Bact.* 1941. **53**, 155.
2. Fleming, A. *Proc. R. Soc. Med.* 1940–41, **34**, 342.

The results show that, of the seven strains resistant to sulphanilamide, only one was resistant to all four drugs and that six of the seven were sensitive to sulphathiazole (2·5 mg. per 100 c.cm)—a concentration which is easily obtained in the circulating blood with the usual dosage.

So far as it goes, this evidence suggests that sulphathiazole is the drug of choice in dealing with resistant strains. Only one, out of 37 strains tested so far, has proved resistant to this drug in a concentration of 20 mg. per 100 c.cm. Other evidence bearing on this question, which cannot profitably be discussed here, suggests that there is much to be learned yet about this property of sulphonamide-fastness and that we should do well to avoid too definite conclusions.

Glasgow. LEONARD COLEBROOK.

THE TEACHING OF MEDICAL STUDENTS

SIR,—I feel sure most clinicians will agree with Dr. Geoffrey Evans that in the teaching of medical students "disease must be the first concern." Preventive and social medicine, in so far as they are not mere political catch-words, are related to environmental factors which should be the proper concern of Government (in which term is included the Ministry of Health and Public Medical Services) and over which the practising physician can exercise but little control. Nevertheless the basis upon which preventive medicine exists and progresses is the experience gained in the treatment of the sick throughout the ages, and the recent fall in the death-rate, as shown by the latest returns of the Registrar-General, is attributable largely to the use of the sulphonamide compounds, rather than to improved sociological conditions.

The diagnosis and treatment of disease is an exacting and whole-time occupation of immense importance to the individual and to the nation. Man is a cyclical animal born to decay and perish, and in the New World, whether it be brave or otherwise, death in his varied and stealthy forms will be ever knocking at the door. He who wishes to become proficient in clinical medicine will be wise if he make no attempt to serve two masters; his vision must be focused on the patient, unobscured by the misty ambiguities of "social medicine" and "positive health"—phrases, to tell truth, which smack more of the politician than the scientist, characterised rather by their slogan appeal to the unthinking than by their relation to any intellectual concept. MacNair Wilson sums up the position well in his *British Medicine*:

"Medicine however stands or falls by its practice. It is clinical or it is nothing and the work done at the bedside is the foundation as it is also the measure of its success."

The cynic might add that medicine is clinical or it is—politics.

Sawbridgeworth. GORDON BURTON.

GAS GANGRENE IN THE MIDDLE EAST

SIR,—Your leading article of July 31 states that a fatality of 50% shows how little progress we have made in 25 years. Is the explanation possibly to be found in your statement that "The best prophylactic of gas gangrene is early and radical surgery"? J. F. Kelly and D. A. Dowell in *Roentgen Treatment of Infections* (Year Book Publishers, 1942, p. 148) show a mortality of 11·5% in 364 cases. Having some little experience in the X-ray therapy of inflammatory conditions—but not of gas gangrene—I brought the matter to the notice of the appropriate authorities some twelve months ago, and suggested that a lorry or an aeroplane should be equipped with a suitable X-ray apparatus so that a controlled investigation into the value of X-ray therapy in gas gangrene might be carried out in the field. The replies received from both British and American Army authorities were unfavourable. I don't know whether any of the 58 men who died in the Middle East could have been saved by radiotherapy, but neither will anybody know until it *is* tried.

St. Bartholomew's Hospital, E.C.1. RALPH PHILLIPS.

*** In the early days of the war the British Army considered the provision of mobile X-ray equipment for the treatment of gas gangrene in the forward areas. Such mobile units would need to work in front of the casualty clearing stations to be effective in fulminating

cases, and this was thought impracticable. The case for the use of X rays in gas gangrene, summarised in these columns three years ago (*Lancet*, 1940, ii, 885), has not carried conviction in this country; it largely stands or falls on the evidence of Professor Kelly and his associates at St. Catherine's Hospital, Omaha.—ED. L.

THE MEDICAL DIRECTORY

SIR,—To maintain the accuracy of our annual volume we rely upon the return of our schedule, which has been posted to each member of the medical profession. Should the schedule have been lost or mislaid we will gladly forward a duplicate upon request. The full names of the doctor should be sent for identification.

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MEDICAL SUPPLIES IN AUSTRALIA

APART from the production of ether and a few inorganic substances, Australia had no drug industry before the war. The reasons were economic—there was not a large enough market to make the manufacture of synthetic substances profitable. It was similarly more profitable to import plant drugs than grow them. But when Japan entered the war home production of drugs became of urgent importance. With an immense amount of investigation undertaken in all parts of the Commonwealth satisfactory processes have been evolved. Morphine, digitalis, caffeine, theobromine, atropine, sulphanilamide and nicotinic acid are now being produced in sufficient quantities to satisfy home requirements, and before long many other organic and inorganic drugs will be produced on a commercial basis. The Council for Scientific and Industrial Research and the Australian Association of Scientific Workers are exploring many different technical fields. Thus, before the war the United Nations relied on Japan for supplies of agar-agar, but in the last two years steps have been taken to make Australia and New Zealand a source of supply both for themselves and the other Allies. Several seaweeds have been found suitable, but *Gracilaria confervoides* is the most abundant. Australian agar has a higher ash and lower nitrogen content than the Japanese variety, but it has proved suitable for bacteriological media and for the jelly round canned meat. One Australian firm is close to production on a commercial scale and two others are engaged on laboratory studies, but no dried agar has yet appeared on the clamorous market.

Parallel development has taken place in the manufacture of surgical instruments and laboratory apparatus. Australia can now provide herself with almost all essential surgical equipment, and should soon be independent of overseas supplies of scientific glassware.

The supply and consumption of medical materials are regulated by the Medical Equipment Control Committee. When this committee was appointed 2½ years ago under National Security Regulations, its first task was to compile a minimum list of drugs needed for the treatment of disease and formulate a policy for obtaining essential supplies whenever and wherever available. It was given wide powers, which include the regulation or prohibition of purchase, sale, use, storage and production of all goods and appliances used for medical, surgical, dental or veterinary purposes. It has aimed at increasing stocks of essential imported items, encouraging home production, and controlling consumption and distribution.

Four subsidiary committees have rendered valuable services. The Surgical Instrument Panel has reorganised the instrument-making industry on a war basis by securing priorities for the supply of materials and men, and obtaining government financial aid for firms making essential instruments; it is closely linked with the contract board which purchases instruments for the Services. The Committee of Scientific Liaison Officers, whose job is the correlation of scientific research with commercial production, has been behind much of the development of home-production of new drugs. The Federal Committee of Wholesale Drug Firms, formed when the firms agreed to unite in building up a supply of essential drugs, has kept an eye on distribution, and has introduced a scheme of voluntary rationing which covers drugs in limited supply. The Pharmaceutical Advisory Panel drew up an emergency formulary of drugs manufactured in Australia, and has lately completed an Australian War Pharmacopœia for use throughout the Commonwealth; this advocates simplicity in prescription writing, and the avoidance of placebos, however well established by tradition.

Other useful work done by the control committee includes a widespread public economy campaign, the control of the export of essential drugs, and arrangements with the Shipping Control Board for transport of supplies to outlying parts of Australia. In a recent report, Sir Alan Newton, chairman of the committee, described it as a unique system of medical equipment administration so far as the United Nations are concerned. If it is to overcome the supply difficulties which are certain to arise in the future, he said, "it must adhere steadfastly to the belief that the end of the war is two years away today and will still be two years away tomorrow."

THE DUST HAZARD

CHRONIC pulmonary disease is one of the risks which menace the workers in a hazardous employment and although, happily, it is not equally intense in all coalfields the total amount of disability it causes makes it a major problem in the industry. Silicosis, chief of the occupational pulmonary diseases due to dust, occurs in coal-miners under conditions determined by the strata and methods of working. Other forms of pneumoconiosis differing radiographically and pathologically from silicosis are also found. They are unequally distributed, with a higher incidence in the anthracite area of South Wales than in the rest of the country, a feature with a parallel in the anthracite fields of the USA and the USSR. This was fully described in the first report on chronic pulmonary disease in South Wales coal-miners.[1] A search for causes was carried on along with the medical survey described in the first report and in the same field, and the results of these environmental studies are now published as the second report [2] covering a vast amount of detailed work on the concentration, composition and particle-size distribution of the dust, the chemical and mineralogical constitution of the strata and the conditions as to temperature, humidity, air movement and the presence of fumes in the working places in the mines. From the examination of the air-borne dust at the working places a significant association was found between the incidence of the disease and (*a*) the average mass concentration of the total air-borne dust, and (*b*) the mass concentration of the ash obtained from this dust; there was evidence too of this association in the calculated mass concentration determined from counts of particles of air-borne dust, especially of particles below 5 microns in size. Chemical and X-ray diffraction analyses showed that, in general, the dust from the mineral matter in anthracite mines with a high incidence of the disease had more quartz than that from low incidence mines, but these differences were not so striking as was the general similarity between the samples irrespective of the incidence of the disease, and a closer study of the coal material itself is suggested in view of a possible differential action on the lung of coals of different rank. Petrological studies suggest that the incidence of the disease is positively associated with the geological changes induced by pressure, it increases as the rank of coal changes from bituminous coal to high-grade anthracite; this association may be indirect. In this connexion there remain petrological problems which merit further study, for example, the occurrence of secondary quartz nuclei in the groundmass of the strata and the distribution of minerals which modify the action of silica. Apart from dust the other factors present in the mine could have, at most, only a contributory part in the development of the disease. More work must be done before the particular constituent of the dust responsible for causing the disease is identified, if, indeed, there be such a constituent, but it can be held as proved that dust is the enemy. The efforts towards its suppression have been intensified by technical measures. Additional mines medical inspectors have been appointed, and more evidence should soon be available for assessing the risk of pneumoconiosis in the coal-mines and giving added precision and effectiveness to preventive measures.

1. *Spec. Rep. Ser. Med. Res. Coun., Lond.* No. 243, 1942.
2. *Ibid*, No. 244, 1943. HMSO. 10s. 6d.

Sir ARTHUR RUCKER, at present chief civil assistant to the Minister of State in Cairo, is shortly to resume his appointment as deputy secretary to the Ministry of Health. Mr. J. C. WRIGLEY who has been acting in his absence will continue as an additional deputy secretary.

Obituary

HAROLD BECKWITH WHITEHOUSE

KT, M S LOND, CH M BIRM, F R C S, F R C O G

Sir Beckwith Whitehouse, professor of midwifery and diseases of women in the University of Birmingham, died with tragic suddenness in London on July 28 in his 61st year. He was returning from BMA House where he had just been invited to preside over the Association for a second year, and was apparently at the top of his form although his friends had been aware of danger signals neglected at the call of duty. He was richly endowed with qualities of mind and heart which made him a master of his craft, an inspiring teacher and an ornament to the Royal College which he helped to found.

Underwoods

Harold Beckwith Whitehouse was born at Ocker Hill, Staffs, educated at Malvern College and entered St. Thomas's Hospital with a scholarship, graduating in 1906 and qualifying for the gold medal at the MS exam. He was in no doubt about his choice of career and after a round of house appointments at St. Thomas's returned to the Midlands as gynæcological surgeon to the Birmingham General Hospital, succeeding Thomas Wilson in 1921 as senior surgeon and three years later in the University chair. In addition to his staff work at the Maternity and United (later Queen Elizabeth) Hospitals he visited hospitals at Nuneaton, Walsall, Redditch, Sutton and Stourport, and had just accepted a call to Malvern. Specially dear to him was his association for 15 years with the Lucy Baldwin maternity at Stourport. He was a deft and quick operator, ensuring success by attention to detail and enjoying its demonstration. But he was much more than that, for he was a keen student of physiology and of the scientific approach to female diseases. His influence over students was remarkable and he had the gift of transferring to them something of his own enthusiasm.

In the last war he went to Rouen with No. 8 General Hospital and was in charge of the surgical division at Etaples. Later he became president of the Birmingham branch of the Joint Red Cross. Despite a private practice which occupied more and more of his time he served on the Radium Commission and was in close touch with professional organisation. He was president of the Midland Obstetrical Society and a foundation member of the Gynæcological Visiting Society. At the XV Club (named after his old ward at the General Hospital) he entertained all his old housemen and registrars at an annual festivity. His hospitality to visitors also became a by-word. In his early days he was a keen botanist and made a valuable collection of butterflies; a zest for shooting remained unimpaired but could seldom be gratified.

He was awarded a knighthood in 1937. In 1909 he married Madge Rae, daughter of Walter Griffith of Handsworth Wood, who survives him with a daughter, serving in ENSA, and two sons of whom the younger is house-surgeon at Queen Elizabeth Hospital.

JOHN GILMOUR

O B E, M B, F R F P S GLASG, F R C S E, D P H

Dr. John Gilmour, who died on July 27 at the age of 72, after a long illness, had made his name in Glasgow as a general practitioner before he was absorbed in the Department of Health for Scotland. Having graduated in medicine with high commendation at Glasgow University in 1891 he spent a year doing house appointments in the Western Infirmary, and afterwards at Brecon. Then he joined his father, Dr. Adam Gilmour, in practice at the little town of Duntocher, in Dunbarton, and later succeeded him there, being affectionately known as "Doctor John." In 1901 he moved to Dalmuir, where he developed a large practice, including Clydebank. During the next twenty years he found time to take two Scottish fellowships and the DPH Camb. In 1921, when the regional medical service was initiated in Scotland, he was appointed to the then Board of Health, soon becoming a familiar figure throughout the South Western area, respected as a clinician and beloved as a friend and counsellor. In due course he became senior RMO in Glasgow, and it was largely due to his personality, his foresight and bonhomie that the relationship between the general practitioner and the regional medical service has been so happy. Having retired in 1936 under the age-limit, on the outbreak of war he returned to the Department of Health in order to release younger colleagues for war service. He kept alive the regional service and later superintended the Clyde Basin experiment for war workers. His name appeared among the honours at the New Year. He was a member of the Home Office commission on workmen's compensation and miners' nystagmus. He leaves two daughters and a son, Dr. Alan Gilmour, who is in the public health service.

Lafayette

EDWARD PHILIP STIBBE

F R C S

Professor Stibbe, who had held for five years the chair of anatomy at King's College, London, died at his home in Gerrards Cross on July 24 at the age of 58 after a protracted illness. His passing has taken from the science of human anatomy a gifted exponent. He had a wide and varied experience which included medical and surgical practice, the tenure of the chair of anatomy in Johannesburg, service in the department of anatomy at University College, the London Hospital, and finally at King's College from 1935 onwards. This was reflected in the character of his lectures which were always interesting and wherever possible illustrated the application of his subject to clinical work. It is not surprising therefore that he won a considerable reputation as a teacher of undergraduate students. He had also the faculty of exercising an influence over students outside the lecture room through the interest he took in their affairs and the sympathy with which he willingly helped to solve their individual problems. He was an indefatigable worker, and not only contributed numerous papers to scientific journals but was the editor of a number of anatomical books, including one on physical anthropology. His latest important contribution was on *The Surgical Anatomy of the Subtentorial Angle*, delivered as a Hunterian lecture to the Royal College of Surgeons in 1936.

Lafayette

There is no doubt that Stibbe's name will be most remembered by those whose privilege it was to know him for his lovable personality, in which kindliness and generosity were outstanding. To his juniors he was always a stimulus and never too busy to listen to their difficulties or to help by advice and encouragement. During the last two years his health gradually failed, but still further did he win the admiration of his friends for his patience and uncomplaining courage as he fought the battle with the disease which claimed his body but never could subdue his spirit.

T. N.

Dr. JOHN POYNTZ RICE who died recently was one of the longest lived dispensary doctors in Ireland. Educated at Clongowes and Queen's College, Cork, he qualified in Edinburgh in 1883. He was appointed dispensary medical officer for Castleisland in 1889 and held this position for half a century till he retired in 1939 to spend his well-earned leisure on his favourite hobbies of gardening and farmng.

Notes and News

University of Cambridge

On July 31 the following degrees were conferred:

MD.—L. J. Bendit, John Yudkin and Ronald Wylie-Smith.

MB, B Chir.—*H. W. Balme, *H. C. Gupta, *John Attenborough, *H. A. Fraser, *Harry Harris, *D. B. Beckwith Whitehouse, Gavin Hildick-Smith, O. L. S. Scott, *R. M. Forrester, *John Lister, *C. S. McKendrick, *P. A. G. Monro, *G. S. Udall, D. H. Makinson, *K. C. Robinson, *O. H. Wolff, *R. A. J. Baily, *D. R. Barnes, *John Davenport, *R. G. May, *R. A. P. Brown, *P. S. Smith, *T. R. Steen, *R. V. Stone, *J. D. Trethowan, E. H. Back, *R. A. D. Crawford, P. G. Mann, *D. J. Conway, *M. B. Devas, *Basil Haigh, *E. H. Hare, *A. S. Mason, *J. E. Oliver, *Ll. R. Twentyman, *W. D. Wylie, N. M. Mann, P. H. Schurr, *Peter Goodman, *D. L. Bridgewater, *M. R. Geake, *W. L. Calnan, *P. H. Mitchell, *W. J. L. Pain, *David Vérel, *I. S. Staddon, *Thomas Norman, C. H. Barnett, *P. H. Rogers*J. C. Lloyd, *R. F. Bates, *D. H. Drennan, *R. N. R. Grant, *J. K. Hinds, *P. F. Jones, *J. McEwen Potter, *E. L. Simons, *E. H. Williams, J. O. Laws, J. R. Robinson,*P. H. Huggill and *R. E. Loder.

* By proxy.

Royal Medical Benevolent Fund

The quarterly meeting of the management committee on July 30 had an encouraging report from the treasurer. How far the real need in these times for the fund to make larger grants to many of its applicants is to be met depends, however, on the extent to which the interest of the profession can be enlisted. The solicitors of the moribund Scottish Poor Law Medical Association had offered its credit balance to the fund on the understanding that any legitimate posthumous claims would be met. In cordially accepting this suggestion the executive commended the idea to other small medical bodies which may now have outlived their function. Discussion took place on the urgency of a home for aged beneficiaries. There is an increasing number of aged and lonely applicants whose chief need is a home. The late Dr. Holdsworth Davis had left his house in Bournemouth along with some money in the hope it might be used as a convalescent home, but restrictions on the property prevented and the house was sold. It would be a kindly act on the part of any who are in a position to do so to augment the Davis Fund so that a home for aged beneficiaries may be realised.

Chartered Society of Massage and Medical Gymnastics

The annual conference will be held on Friday and Saturday, Sept. 24 and 25, at BMA House. Mr. R. D. Langdale Kelham will give the opening lecture at 10.30 AM on the first day, when he will discuss the preparation of amputation stumps for limb-wearing from the point of view of the physiotherapist. Other speakers will include: Lieut.-Colonel St. J. D. Buxton, physiotherapy in the Middle East; Mr. R. W. Watson Jones rehabilitation, physiotherapy and orthopædics; Dr. J. L. Livingstone, work of a chest unit; and Dr. W. J. Craft, a demonstration of the bandaging of amputation stumps for limb-wearing. Brigadier F. D. Howitt who is to deliver the founders' lecture has chosen as his subject The Widening Horizon. Applications for tickets should be sent to the assistant secretary of the society, Tavistock House, London, W.C.1.

Medical Honours

The following awards to medical men have lately been announced:

CBE—Colonel Alexander Bremner, MC, MD EDIN., RAMC; Colonel D. G. Cheyne, OBE, MC, MD ABERD., RAMC; Colonel E. E. S. Wheatley, DFC, MRCS, RAMC.

MBE—Major J. Hay Arthur, MB ABERD., IMS; Major J. Hickey, RAMC; Major W. J. Young, IMS.

DSC—Surgeon Lieutenant D. M. Sheppard, MB EDIN., RNVR, and Surgeon Lieutenant A. S. Duncan, FRCSE, RNVR.

King Edward's Hospital Fund for London

Presiding over the 46th annual meeting on July 23, the Duke of Gloucester urged that our voluntary hospitals are part and parcel of the democratic structure of society and that upon their interaction with the official provision through the state and through the local authorities depends the power of the whole system to grow and adapt itself to changing conceptions of public need. On the medical side, he continued, we want to make sure that central supervision and coördination shall leave room for those whose ideas may not immediately commend themselves to those in authority. The president announced that arising from the memorandum on hospital diet, prepared by a subcommittee under the chairmanship of Sir Charlton Briscoe, a special committee was being set up under Prof. J. C. Drummond, D SC, to advise and help hospitals on this subject. With the help of three members of the nursing profession the distribution committee had also been considering the supervision of nurses' health and had made some helpful suggestions. In presenting his report Sir Edward Peacock, the treasurer, said that the total income for 1942 was over £330,000 and over £290,000 had been distributed to hospitals, preliminary training schools for nurses and for special services.

BRITTLE NEEDLES.—We are informed that there are still hypodermic needles on the market of German manufacture, and that these are liable to break in use, whereas this is rare in needles of British make; thus one British manufacturer has had only one complaint of a needle breaking in eight years during which they have produced some 7½ million needles.

Infectious Disease in England and Wales

WEEK ENDED JULY 31

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1979; whooping-cough, 1896; diphtheria, 609; paratyphoid, 10; typhoid, 13; measles (excluding rubella), 2262; pneumonia (primary or influenzal), 432; puerperal pyrexia, 163; cerebrospinal fever, 47; poliomyelitis, 11; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 99; ophthalmia neonatorum, 78. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service-sick in the Infectious Hospitals of the London County Council on July 28 was 1608. During the previous week the following cases were admitted: scarlet fever, 190; diphtheria, 45; measles, 38; whooping-cough, 34.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 2 (0) from measles, 10 (0) from whooping-cough, 6 (1) from diphtheria, 61 (11) from diarrhœa and enteritis under two years, and 9 (1) from influenza. The figures in parentheses are those for London itself.

Liverpool reported 8 deaths from diarrhœa, no other great town more than 4.

The number of stillbirths notified during the week was 255 (corresponding to a rate of 37 per thousand total births), including 26 in London.

Appointments

BABER, MARGARET D., MD LOND., MRCP: resident physician at St. Helier County Hospital, Carshalton.

HEYWOOD, C. P., MB MANC.: asst. VD MO for Co. Durham and Northumberland and for Gateshead and Newcastle-on-Tyne.

LAWRENCE, W. C., MB LOND.: asst. fracture and orthopædic surgeon at the Coventry and Warwickshire Hospital.

MARTIN, A. JOYCE, MRCS: temp. physician in psychological medicine to St. John's Hospital, Lewisham.

MICHAELIS, WILLY, MD FREIBURG: asst. radiologist at the Coventry and Warwickshire Hospital.

SMITH, V. TURNER, MD MANC.: visiting asst. aural surgeon to the Oldham Royal Infirmary.

WALKER, R. J., MB CAMB.: examining factory surgeon for Presteigne, Radnor.

WAREHAM, A. M., MB LOND., DOMS.: temp. asst. school MO for Bedfordshire.

Births, Marriages and Deaths

BIRTHS

ADLINGTON.—On July 30, at Gainsborough, the wife of Dr. Roy Adlington—a daughter.

ALCOCK.—On July 31, at Terrick, Aylesbury, the wife of Squadron-Leader N. S. Alcock, MRCP—a daughter.

ESLER.—On Aug. 2, at Caversham, the wife of Dr. A. R. Esler—a son.

FENTON.—On July 13, at Datchet, the wife of Major C. E. Fenton, RAMC, of Barking and Chelmsford—a son.

MARRIAGES

ELLIS—BRANNIGAN.—On July 3, in India, Hugh Lewis Ellis, major RAMC, to Kathleen Jacqueline Brannigan, IANS.

EVANS—SOUTHON.—On Aug. 3, Leslie Francis Evans, captain RAMC, of Bolton, to Edith Anne Southon, VAD.

WHITFIELD—HOWE.—On June 12, at St. Mawgan-in-Meneage, Phillips Whitfield, captain RAMC, to Pauline Howe.

DEATHS

ALDOUS.—On Aug. 7, at Matfield, Kent, Robert Aldous, LRCPE.

CHETHAM-STRODE.—On Aug. 7, in London, Reginald Chetham-Strode, MB EDIN., aged 81.

JEHU.—On July 18, Thomas John Jehu, MD EDIN., FRSE, emeritus professor of geology in the University of Edinburgh, aged 72.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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FINAL EXAMINATION: SURGERY, October 11th, November 8th, December 6th, 1943; MEDICINE, PATHOLOGY, October 18th, November 15th, December 13th, 1943; MIDWIFERY, October 19th, November 16th, December 14th, 1943.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

The Milroy Lectures on State Medicine AND PUBLIC HEALTH.

The Council of the Royal College of Physicians of London are prepared to receive applications for the office of MILROY LECTURER for 1945.

Applications must be addressed to the REGISTRAR, Royal College of Physicians, Pall Mall East, on or before 18th September, 1943, and should contain a statement of the division of the subject selected by the candidate.

The Course consists of Two Lectures.

The Lectures are to be given on a Tuesday and Thursday in February or March, 1945.

A copy of Dr. Milroy's "Suggestions" on the subject of his bequest, and information as to the emolument, may be obtained from the Registrar.

July, 1943.

Royal College of Physicians of London.

The next ordinary PROFESSIONAL EXAMINATION for the MEMBERSHIP will commence on WEDNESDAY, 6TH OCTOBER, 1943.

Candidates are required to give twenty-one days' notice in writing to the Registrar of the College, to whom all certificates and testimonials required by the bye-laws must be sent at the same time.

Candidates who propose to submit published work under the regulations now in force are required to give twenty-eight days' notice, and should apply in writing to the Registrar, without delay, for detailed instructions as to the procedure they should follow. H. E. A. BOLDERO, M.D., Registrar.

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MONDAY, 6TH SEPTEMBER.

FIRST EXAMINATION
(Anatomy, Physiology, and Pharmacology)
MONDAY, 13TH SEPTEMBER.

FINAL EXAMINATION
(Pathology, Medicine, Surgery, and Midwifery)
TUESDAY, 5TH OCTOBER.

Candidates who have fulfilled the necessary conditions, and who desire to present themselves for Examination, must give notice in writing to the Secretary, Examination Hall, 8–11, Queen-square, London, W.C.1, at least twenty-one days before the date of the Examination, transmitting at the same time such certificates as may be required by the Regulations of the Board, together with the full amount of the fee due for the subject or subjects for which they desire to enter.

HORACE H. REW, Secretary.

University of Aberdeen.

SESSION 1943–44.

The Winter Term for all Students will open on TUESDAY, 19TH OCTOBER, 1943, except Engineering Students entering on their third year of study who will commence on TUESDAY, 28TH SEPTEMBER, 1943.

NOTE.—ALL MALE STUDENTS (INCLUDING THOSE ENTERING THE UNIVERSITY FOR THE FIRST TIME IN OCTOBER), OTHER THAN THOSE ALREADY ENROLLED IN THE MEDICAL UNIT OF THE SENIOR TRAINING CORPS, MUST REPORT AT THE HEADQUARTERS OF THE SENIOR TRAINING CORPS OR UNIVERSITY AIR SQUADRON AT 9 A.M. ON TUESDAY, 12TH OCTOBER, 1943.

H. J. BUTCHART, Secretary.

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Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

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For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

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London County Council.

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Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

TEMPORARY ASSISTANT MEDICAL OFFICERS, Class II (B2). Salary £250.

HACKNEY HOSPITAL, High-street, Homerton, E.9.—Mainly medical duties.

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QUEEN MARY'S HOSPITAL FOR CHILDREN, Carshalton, Surrey.—Diseases of children.

R and W practitioners who now hold A posts may apply, when appointments will be limited to six months.

The above positions are with board, lodging, and washing. Married quarters are not available.

Application forms, obtainable from the MEDICAL OFFICER OF HEALTH (S.D.2), County Hall, S.E.1 (stamped addressed foolscap envelope necessary), returnable by 23rd August. Canvassing disqualifies.

West London Hospital, Hammersmith, W.6.

Applications are invited for the post of RESIDENT SURGICAL REGISTRAR AND TUTOR (B1), vacant shortly. The successful applicant will be enrolled in the E.M.S. and the salary, payable by the Ministry of Health, will be at the rate of £350 or £550 per annum, according to age and experience. The duties include teaching in the Medical School. It is desirable, though not essential, that candidates should hold one of the higher degrees or diplomas in surgery. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, giving full details of age, medical school, qualifications with dates, experience, and nationality, and accompanied by copies of three recent testimonials, should reach me not later than 2nd September. Selected candidates will be required to attend a joint meeting of the Medical Council and House Committee on a date that will be notified.

H. A. MADGE, Secretary.

Royal Northern Hospital, Holloway, N.7.

Applications are invited from registered medical practitioners for the appointment of SURGICAL REGISTRAR (B1), vacant 12th October, 1943. Applicants should have held house appointments and had surgical experience. Salary under E.M.S. scale from £350 to £550 per annum, according to experience. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent by 20th August to the undersigned, from whom forms of application and rules may be obtained.

GILBERT G. PANTER, Secretary.

South London Hospital for Women,
Clapham Common, S.W.4.

Applications are invited from registered medical Female practitioners for the undermentioned appointments, vacant 1st October :—

(1) GYNÆCOLOGICAL HOUSE SURGEON (B2). The appointment, which is recognised for M.R.C.O.G., is for a period of six months. Salary is at the rate of £100 per annum, with full residential emoluments. W practitioners who now hold A posts may apply.

(2) RESIDENT MEDICAL OFFICER (B1). Applicants should have held house appointments. Salary is at the rate of £200 per annum, with full residential emoluments. W practitioners who now hold B2 posts may apply.

Applications, stating age, nationality, qualifications with dates, and accompanied by copies of three recent testimonials, should be sent to the SECRETARY at the Hospital as soon as possible.

Miller General Hospital,
Greenwich High-road, S.E.10.

Applications are invited from registered medical practitioners, Male, for the appointment of RESIDENT OUT-PATIENT OFFICER (B1), vacant 23rd August, 1943. The post offers good facilities for practitioners studying for the higher examinations. Salary is at the rate of £250 per annum, with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, giving full particulars, should be sent before 17th August, 1943, to : ERNEST E. MARKS, Secretary.

30th July, 1943.

Royal London Ophthalmic Hospital
(MOORFIELDS EYE HOSPITAL), City-road, E.C.1.

Applications are invited for the post of THIRD HOUSE SURGEON (B1). Candidates must be registered medical practitioners and must be prepared to begin duties on the 1st November, 1943. Suitably qualified R practitioners holding B2 appointments, also those holding B1 posts and rejected by the R.A.M.C., may apply. Salary at the rate of £100 per annum, with board and residence in the Hospital.

The appointment is for the period of six months subject to the approval of the Central Medical War Committee, and the candidate at the completion of that time will be eligible for appointment as Second House Surgeon, First House Surgeon, and subsequently as Senior Resident Officer for similar periods.

Applications, with testimonials, stating age and qualifications, must be received not later than the 30th August, 1943.

A. J. M. TARRANT, Secretary.

St. Mark's Hospital for Cancer, Fistula
AND OTHER DISEASES OF THE RECTUM,
City-road, London, E.C.1.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 1st October next. Preference will be given to candidates holding diploma of F.R.C.S. Salary £550 per annum, subject to approval by the E.M.S. R practitioners holding B2 appointments, and those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, and accompanied by copies of three recent testimonials, must reach the undersigned on or before Wednesday, 1st September, 1943.

RAYMOND BULL, Secretary.

St. Mark's Hospital for Cancer, Fistula
AND OTHER DISEASES OF THE RECTUM,
City-road, London, E.C.1.

Applications are invited for a CLINICAL ASSISTANTSHIP in the OUT-PATIENTS' DEPARTMENT on Monday afternoons. The appointment is for six months from September next in the first instance, and a fee of three guineas is payable on appointment.

Applications to reach the SECRETARY (from whom further particulars may be obtained) at the Hospital by Monday, 30th August, 1943.

Royal Northern Hospital, Holloway, N.7

Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (A), vacant 8th September, for a period of six months. Salary and emoluments approximately £120 per annum, and board, residence, and laundry. Practitioners within three months of qualification and liable under the National Service Acts may apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent not later than 20th August to—

G. G. PANTER, Secretary.

The London Chest Hospital,
Victoria Park, E.2.

Applications are invited for a Part-time SURGICAL REGISTRAR with experience in Thoracic Surgery. Salary up to £350 per annum.

Applications to be submitted to the undersigned on or before 27th August, stating age, qualifications, experience, together with three copies of recent testimonials. Further particulars may be obtained from : THOMAS BROWN, Secretary.

Bolingbroke Hospital,
Wandsworth Common, S.W.11.

Applications are invited from registered medical practitioners (Male) for the appointment of HOUSE PHYSICIAN AND CASUALTY OFFICER (A), vacant 1st September. The appointment is for six months. Salary is at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of three recent testimonials, should be sent on or before 18th August to—

W. S. RANDOLPH BISS, Secretary-Superintendent.

Bolingbroke Hospital,
Wandsworth Common, S.W.11.

Applications are invited from registered medical practitioners for the following appointments :—

TEMPORARY PATHOLOGIST.—The appointment will be for the period of the war, and the successful candidate will be required to attend at the Hospital on one or two days a week. A payment will be made at the rate of two and a half guineas per attendance.

TEMPORARY ANÆSTHETIST.—The appointment will be for the period of the war, and the successful candidate will be required to undertake anæsthetic duties on one or more half-days per week. There is an honorarium of thirty guineas a year attaching to the post.

Applications, stating age, qualifications, &c., accompanied by copies of three testimonials, to be sent on or before the 18th August to—

W. S. RANDOLPH BISS, Secretary-Superintendent.

The Elizabeth Garrett Anderson
HOSPITAL, Euston-road, N.W.1

At OSTER HOUSE E.M.S. HOSPITAL, St. Albans.

Applications are invited from registered medical Women practitioners for the appointment of HOUSE SURGEON (A), vacant 1st September, 1943. Appointment for six months. Salary £100 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, with two copies of each of three testimonials, should be sent to the SECRETARY of The Elizabeth Garrett Anderson Hospital by 18th August.

Weir Hospital,
Weir-road, Balham, London, S.W.12.

Part-time Locum MEDICAL OFFICER, Female (for one afternoon, one evening, and every other week-end). Salary at the rate of £100 p.a., with emoluments.

Apply to the HONORARY SECRETARY-SUPERINTENDENT.

The Willesden General Hospital,
Harlesden-road, N.W.10.

Applications are invited from registered medical practitioners for the appointment of RESIDENT CASUALTY OFFICER (B2), vacant 1st October, 1943. The appointment will be for a period of six months. Salary £175 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent to : J. N. DRAKE, Secretary.

British Post-graduate Medical School
(UNIVERSITY OF LONDON).

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 30th September, 1943. The appointment is for six months. The salary is at the rate of £105 per annum, plus full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, together with copies of three recent testimonials, should be made to the DEAN, British Postgraduate Medical School, Ducane-road, Shepherd's Bush, W.12, not later than Monday, 30th August, 1943.

The Hospital for Sick Children,
Great Ormond-street, London, W.C.1.

There are vacancies for Three CLINICAL ASSISTANTS, who will be required to attend morning sessions in the MEDICAL OUT-PATIENT DEPARTMENT. Payment will be made on a sessional basis. Preference will be given to Members of the Royal College of Physicians, holding the Diploma in Child Health.

Forms of application and further particulars will be sent on application. H. F. RUTHERFORD, Secretary.

Huddersfield Royal Infirmary.
(321 Beds.)

CASUALTY OFFICER (B2) required to commence duty on 31st August, 1943. Salary at the rate of £200, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Applications should be sent as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

County Borough of Wolverhampton.

TEMPORARY ASSISTANT MEDICAL OFFICER OF HEALTH.

Applications are invited from duly registered medical practitioners of either sex for the above-mentioned appointment, at a salary of £650 per annum, plus war bonus and a car allowance on Class 2 of the Council's scale. The appointment is likely to continue for the duration of the war but will be terminable by two months' notice on either side.

Candidates must have had special postgraduate experience in infectious diseases, infant welfare, and antenatal work, and should preferably hold a Diploma in Public Health or State Medicine.

Under present regulations it is necessary for medical officers (as defined in Ministry of Health Circular 2818) liable by date of birth to military service, irrespective of medical unfitness or other exemption, to apply to the Ministry of Health to ascertain whether or not they will be permitted to apply for the vacancy.

Duties normally will be in connexion with the Maternity and Child Welfare Services and infectious diseases, but the officer appointed will be required to carry out any other duties assigned to him/her by the Medical Officer of Health.

The successful candidate will be required to devote the whole of his/her time to the duties of the office and will not be permitted to engage in private practice.

Applications, stating age, qualifications, and experience, with copies of three recent testimonials, should be sent not later than 28th August, 1943, to: J. BROCK ALLON, Town Clerk.

Town Hall, Wolverhampton, August, 1943.

County Borough of Grimsby.

GRIMSBY CORPORATION HOSPITAL. (180 Beds.)

Applications are invited at once from registered medical practitioners (Male or Female) for the post of RESIDENT MEDICAL OFFICER (B1).

The Hospital contains 100 Beds for all forms of tuberculosis and 80 Beds for fevers. Salary £350–£25–£450, plus war bonus, with board, lodging, and laundry. The post is temporary during the absence of the holder on war service. Superannuation Act in force. Duties in connexion with diphtheria immunisation. R and W practitioners holding B2 posts, also R practitioners holding B1 posts and rejected by the R.A.M.C., may apply.

Canvassing of members of the Council or any committee of the Council, directly or indirectly, will disqualify the candidate for the appointment. Candidates for the appointment must, when making application, disclose in writing whether to their knowledge they are related to any member of or the holder of any senior office under the Council. Failure to do this will disqualify the candidate for the appointment.

Applications, with testimonials, to the Medical Officer of Health, 1, Bargate, Grimsby. L. W. HEELER, Town Clerk.

Municipal Buildings, Grimsby, 9th August, 1943.

City and County of Bristol.

DEPARTMENT OF PUBLIC HEALTH.

SOUTHMEAD HOSPITAL.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICERS (A), vacant 31st August, 1943. Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months; otherwise not exceeding one year.

Forms of application may be obtained from the MEDICAL OFFICER OF HEALTH, Kenwith Lodge, Westbury Park, Bristol, 6, and should be returned, accompanied by not more than three recent testimonials, not later than 25th August, 1943.

The St. Helens Hospital.

Applications are invited from registered medical practitioners for the following appointments, vacant 1st September:—

HOUSE SURGEON (B2). Salary at the rate of £225 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

HOUSE SURGEON (A). Salary at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of three recent testimonials, should be sent not later than 24th August, 1943, to—

GEO. HARPER, Secretary.

Liverpool Eye, Ear and Throat INFIRMARY.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (B2), AURAL DEPARTMENT. Salary at the rate of £120 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Particulars, stating age, nationality, and qualifications, to be forwarded to: GEO. NICKSON, J.P., Secretary.

Myrtle-street, Liverpool, 7.

Princess Royal Emergency Hospital, SWANSEA.

Applications are invited from registered medical practitioners, Male or Female, for the post of TEMPORARY ASSISTANT MEDICAL OFFICER (B1). The officer appointed will be in charge, under the direction of the Medical Superintendent, of a detached block accommodating approximately 50 ex-service T.B. patients and a small number of Serving Officers needing Hospital treatment. Salary £400 per annum increasing annually by £25 to £500 per annum plus War Bonus together with residential emoluments valued at £135 per annum. R and W practitioners holding B2 posts, also R practitioners holding B1 and rejected by the R.A.M.C., may apply.

Applications to the Medical Superintendent as soon as possible and not later than 31st August.

The Royal Hospital, Wolverhampton.

(Incorporated under Royal Charter.) (310 Beds.)

Applications are invited from registered practitioners (Male and Female) for the post of RESIDENT REGISTRAR (B1) to the EAR, NOSE, AND THROAT DEPARTMENT. Candidates must have held house appointments and be competent to undertake routine clinical and operative work. Salary is at the rate of £250 or more p.a., according to experience. R and W practitioners holding B2 posts, also R practitioners holding B1 posts and rejected by the R.A.M.C., may apply.

W. COCKBURN, House Governor.

Grimsby and District General Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the following appointments:—

RESIDENT SURGICAL OFFICER (B1), vacant 1st September, 1943. Salary at the rate of £300 p.a. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

RESIDENT ORTHOPÆDIC OFFICER (B2), vacant 1st October, 1943. Salary at the rate of £275 p.a., with full residential emoluments.

RESIDENT ANÆSTHETIST (B2), vacant 1st October, 1943. Salary at the rate of £200 p.a., with full residential emoluments. The B2 appointments are for six months and R and W practitioners who now hold A posts may apply.

Applications, stating age, nationality, qualifications, and copies of three recent testimonials, to the SUPERINTENDENT.

Leicester Royal Infirmary.

VACANCIES, 1st October, 1943.

Applications are invited from registered medical practitioners, Male and Female, on or before 27th August, for following posts:

GYNÆCOLOGICAL AND OBSTETRIC HOUSE SURGEON (B2). Minimum salary £125 per annum. The post includes supervision of Obstetrical Unit for abnormal cases.

TWO HOUSE SURGEONS (A). Salary £125 per annum.

RESIDENT ANÆSTHETIST (B2). Salary £150 per annum.

SENIOR CASUALTY OFFICER (B1). Salary £200 per annum. A suitable candidate will be asked to deputise for Resident Surgical Officer.

JUNIOR CASUALTY OFFICER AND EAR, NOSE AND THROAT HOUSE SURGEON (A). Salary £125 per annum.

ORTHOPÆDIC OFFICER (B2). Minimum salary at the rate of £200 per annum. The work includes a large Fracture Clinic.

TWO HOUSE PHYSICIANS (A). Salary £150 per annum.

6 months' appointments. All with full residential emoluments.

For the B1 post: Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

For the B2 posts: R and W practitioners who now hold A posts may apply.

For the A posts: Practitioners within three months of qualification and liable under the National Service Acts may also apply.

The B2 and A appointments will be made on 8th September.

H. T. PLOWMAN, House Governor and Secretary.

6th August, 1943.

Scarborough Hospital, Yorkshire.

(Normally 140 Beds.)

Applications are invited from Female registered medical practitioners for the post of HOUSE SURGEON (A). The appointment is for six months commencing immediately, at a salary of £175 per annum, with board, residence, laundry, &c. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, with age, testimonials, qualifications, &c., to be sent immediately to the SECRETARY.

The Royal Hospital, Wolverhampton.

(Incorporated under Royal Charter.) 310 Beds.

Applications are invited from registered medical practitioners, Male, for the appointment of HOUSE SURGEON (B2), FRACTURE AND ORTHOPÆDIC DEPARTMENT, now vacant. Salary is at the rate of £150 per annum, with full residential emoluments. R practitioners who now hold A posts may apply, when appointment will be limited to six months.

Applications to be sent to W. COCKBURN, House Governor.

19th July, 1943.

The Stockport Infirmary.

(5 Residents.)

Applications are invited from registered medical practitioners for the appointments of :—

RESIDENT SURGICAL OFFICER (B1), vacant early September. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary £250, with full residential emoluments.

ASSISTANT RESIDENT SURGICAL OFFICER (B1), vacant 31st August. Applicants should have held house appointments and had surgical experience. Salary £175, with full residential emoluments.

Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may also apply.

Applications, stating age, qualifications, and previous posts held, accompanied by copies of three recent testimonials, should reach the undersigned by 18th August.

H. G. PRICE, Secretary-Superintendent.

Royal Infirmary, Preston.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 20th September. The post affords an excellent opportunity for improving surgical practice. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding the diploma of F.R.C.S. Salary will be according to qualifications and experience, but a minimum of £350 (together with full residential emoluments) will be paid to a successful candidate possessing the F.R.C.S. diploma. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating full particulars and enclosing copy testimonials, should be addressed to—

Royal Infirmary, Preston. JOHN GIBSON, Superintendent.

Hull Corporation Health Department.

ANLABY ROAD HOSPITAL.

TEMPORARY ASSISTANT MEDICAL OFFICER (B1).

Applications are invited for the above appointment from registered medical practitioners of either sex. Salary £350 per annum, rising by annual increments of £25 to £450 per annum, plus war bonus, together with an allowance at the rate of £150 per annum in lieu of board, residence, and laundry outside the Hospital. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Forms of application, &c., may be obtained from, and should be returned duly completed to, the MEDICAL OFFICER OF HEALTH, Guildhall, Hull, not later than 10 A.M. on Monday, the 30th August, 1943.

The Burslem Haywood and Tunstall War Memorial Hospital,

High-lane, TUNSTALL, STOKE-ON-TRENT.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), vacant shortly. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of six months.

Applications to : C. E. LOWNDES, Secretary.

St. Albans and Mid Herts Hospital,

Church-crescent, ST. ALBANS, HERTS. (58 Beds.)

Applications are invited from registered medical practitioners, Male or Female, for the appointment of ASSISTANT RESIDENT MEDICAL OFFICER (A), vacant 18th August, 1943. Salary at the rate of £150 p.a., with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when the appointment will be for six months.

Applications, giving full particulars, to—

Mr. P. R. BATTISON, Secretary.

Cornwall Mental Hospital, Bodmin,

CORNWALL.

TEMPORARY ASSISTANT MEDICAL OFFICER (B1), Male or Female, required 1st October, 1943. Salary £8 8s. per week, plus residential emoluments. Travelling expenses paid. R and W practitioners holding B2 posts, also R practitioners holding B1 posts and rejected by the R.A.M.C., may apply.

Applications to the MEDICAL SUPERINTENDENT.

Royal Sheffield Infirmary and Hospital.

Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER (B1) at the ROYAL HOSPITAL, Sheffield. Applicants should have held house appointments and had surgical experience. Salary is at the rate of £150 per annum, with full residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications should be sent immediately to—

W. H. BOOTH, Secretary.

City of Coventry.

MUNICIPAL GENERAL HOSPITAL.

Applications are invited for the vacant post of ASSISTANT RESIDENT MEDICAL OFFICER (A) from Male registered medical practitioners, including those within three months of qualification and liable under the National Service Acts, when appointment will be for a period of six months ; otherwise will not exceed one year. Salary is at the rate of £150 per annum, with full residential emoluments. Appointment affords good opportunity of general experience.

Applications, stating age, nationality, qualifications, and experience, to be made as soon as possible to—

A. MASSEY, Medical Officer of Health.

The Council House, Coventry, 5th August, 1943.

Kent and Canterbury Hospital,

CANTERBURY. (336 Beds.)

Applications are invited from Male registered medical practitioners for the appointment of HOUSE SURGEON (B2), vacant 15th September, 1943. Salary is at the rate of £125 per annum, with full residential emoluments. R practitioners now holding A posts may apply, when appointment will be limited to six months.

Applications, together with copies of testimonials, and stating age, nationality, and experience, should be sent immediately to—

J. F. KENT, Superintendent and Secretary.

County Borough of Rotherham.

MUNICIPAL GENERAL HOSPITAL.

RESIDENT ASSISTANT MEDICAL OFFICER (A).

Applications are invited from medical practitioners, including those within three months of qualification and liable under the National Service Acts, for the above appointment. The appointment will be for a period of six months. Salary is at the rate of £200 per annum, together with full residential emoluments. A temporary bonus amounts at present to 6s. 6d. per week.

Forms of application may be obtained from the Medical Superintendent, the Municipal General Hospital, Moorgate, Rotherham, and must be returned to the undersigned, endorsed "Assistant Medical Officer," not later than the 31st August, 1943. CHAS. L. DES FORGES, Town Clerk.

Municipal Offices, Rotherham, 5th August, 1943.

Cumberland Infirmary. (219 Beds.)

Applications are invited from registered medical practitioners for the post of HOUSE SURGEON (A) to the EYE AND E.N.T. DEPARTMENTS, vacant 1st October. Salary is at the rate of £160 per annum, with board, &c. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, accompanied by copies of three recent testimonials, should be sent to the SECRETARY-SUPERINTENDENT immediately.

Carlisle, 6th August, 1943.

King Edward VII Hospital, Windsor.

Applications are invited from registered medical practitioners Male or Female, for the appointment of HOUSE SURGEON (B1) in charge of IN- AND OUT-PATIENT CASUALTIES AND ACCIDENT SERVICE, vacant immediately It is desirable that applicants should hold the qualification F.R.C.S. Salary is at the rate of £300 per annum, with full residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, qualifications with dates, and nationality, together with copies of three recent testimonials, should be sent as soon as possible to : G. WESTON, Secretary.

Northampton General Hospital.

(408 Beds.)

Applications are invited immediately from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A). Salary at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

GORDON S. STURTRIDGE.

Oldham Royal Infirmary. (204 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £400 per annum, with board, residence, and laundry. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, together with copies of three recent testimonials, to be addressed to—

F. W. BARNETT, General Superintendent and Secretary.

County Council of Durham.

DRYBURN EMERGENCY HOSPITAL, DURHAM.

APPOINTMENT OF TEMPORARY MEDICAL OFFICER (RESIDENT) (A).

Applications are invited from registered medical practitioners, Male and Female, for the above-named appointment, now vacant. Salary is at the rate of £120 per annum, with full residential emoluments. The appointment is subject to the regulations for the time being of the County Council relative to the payment of salary in the case of sickness, and the successful applicant will be required to pass the County Council's medical examination. The appointment is terminable by one calendar month's notice on either side. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months; otherwise not to exceed one year.

Applications, stating age, experience, liability for military service, medical fitness, position as regards deferment, &c., together with copies of not more than three recent testimonials, should be addressed to the County Medical Officer of Health, Shire Hall, Durham, and received by him as early as possible.

J. K. HOPE, Clerk of the County Council.

Shire Hall, Durham, August, 1943.

Liverpool County Borough.

LOCAL EDUCATION AUTHORITY.

CHILD GUIDANCE CLINIC.

Applications are invited from Men or Women who are ineligible for service in H.M. Forces for the post of PSYCHIATRIST, either full time or part time. The salary offered is £800 per annum, plus war bonus if full time, which at present is £24 per annum, and £400 per annum (no war bonus) for part-time service of five sessions per week.

The officer appointed will work under the direction of the Medical Officer to the Education Authority, and if appointed in a full-time capacity will not be allowed to undertake private practice. The appointment will be subject to the Standing Orders of the City Council, and in the case of a full-time appointment to the Local Government Superannuation Act, 1937.

The canvassing of members of the Education Committee or City Council is strictly prohibited and will be considered a disqualification.

Applications, giving full particulars, such as date of birth, educational training, qualifications, and experience, together with copies of three recent testimonials or the names of three persons to whom reference could be made, should be sent to the undersigned by the 31st August, and endorsed "Child Guidance Clinic."

W. H. BAINES, Town Clerk,
and Clerk to the Local Education Authority.

Middlesbrough Education Committee.

Applications are invited from duly qualified Men or Women for the temporary post of SENIOR ASSISTANT SCHOOL MEDICAL OFFICER (to act whilst permanent officer is on war service) in connexion with the medical inspection and treatment of school-children and such other duties as may be required by the Education Committee. Salary scale £700 per annum by £50 to £850 per annum. The Committee will take into account previous experience as an Assistant School Medical Officer in determining the amount of the commencing salary. The successful candidate will be required to devote his/her whole time to the duties of the office.

Forms of application may be obtained from the undersigned, and should be returned not later than Tuesday, 31st August, 1943.

STANLEY MOFFETT, Director of Education.

Education Offices, Middlesbrough, 3rd August, 1943.

Staffordshire County Council.

STANDON HALL ORTHOPÆDIC HOSPITAL,
Near ECCLESHALL, STAFFORD. (120 Beds.)

RESIDENT MEDICAL OFFICER (B1).

Applications are invited from suitably qualified registered medical practitioners for the above-mentioned post, now vacant. The Hospital has an E.M.S. Fracture Department A. Salary is at the rate of £350 per annum, with full residential emoluments, and the appointment will be subject to one calendar month's notice on either side. The appointment will not exceed one year. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications must reach the undersigned by 26th August, 1943.

T. H. EVANS, Clerk of the County Council.

County Buildings, Stafford.

County Borough of Preston.

SHAROE GREEN HOSPITAL. (250 Beds.)

Applications are invited from registered medical practitioners, Female, for the appointment of JUNIOR RESIDENT MEDICAL OFFICER (A), vacant 1st October, 1943. Salary is at the rate of £150 per annum, with full residential emoluments. W practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months; otherwise not exceeding one year.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, to the MEDICAL SUPERINTENDENT, Sharoe Green Hospital, Fulwood, Preston.

The King Edward VII Welsh National Memorial Association.

Applications are invited from registered medical practitioners (Male or Female, single) for the appointment of TEMPORARY ASSISTANT RESIDENT MEDICAL OFFICER (B1) at the ADELINA PATTI HOSPITAL, Craig-y-nos, Swansea Valley (114 Beds for the treatment of pulmonary tuberculosis in men and women, and surgical tuberculosis in children).

Applicants should have held house appointments and had institutional experience in the treatment of pulmonary tuberculosis.

Salary £350 per annum, plus full residential emoluments.

Suitably qualified R and W practitioners holding B2 appointments, also R practitioners now holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications, and experience, with particulars as to liability for military service and medical fitness, together with copies of three recent testimonials, should reach the undersigned by 23rd August.

V. EMRYS JONES, Acting Principal Medical Officer.

Memorial Offices, Cathays Park, Cardiff.

General Hospital, Nottingham.

(585 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ANÆSTHETIST (B1), vacant 24th September. The appointment will be for a period of twelve months. The salary is at the rate of £300 per annum, with full residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, qualifications, experience, &c., together with copies of testimonials, to be sent to—

H. M. STANLEY, House Governor and Secretary.

Northampton General Hospital.

Applications are invited from registered medical practitioners, Male or Female, for the post of Whole- or Part-time RADIO THERAPIST. Salary £750–£1000, according to experience. If part time, salary will be subject to adjustment according to time available. Applicants should have had experience in radiotherapy and should possess the qualification of D.M.R.E.

Applications and copies of three recent testimonials should be sent to: GORDON S. STURTRIDGE.

31st July, 1943.

St. Margaret's Hospital, Epping.

Applications are invited from registered medical practitioners, Male only, including R practitioners who now hold A posts, for the appointment of a HOUSE OFFICER (B2) at the above Hospital. The salary is at the rate of £200 p.a., with full residential emoluments. To R practitioners the appointment will be limited to six months; otherwise will not exceed one year.

Applications should be made in writing to the COUNTY MEDICAL OFFICER, County Hall, Chelmsford, and should include applicant's full name, age, nationality, qualifications, and details of previous posts (if any), and whether liable to service under the National Service Acts.

Surrey County Council.

PUBLIC HEALTH DEPARTMENT.

KINGSTON COUNTY HOSPITAL, Wolverton-avenue,
KINGSTON-ON-THAMES. (500 Beds.)

APPOINTMENT OF TWO HOUSE OFFICERS (A).

Applications are invited from registered medical practitioners, Male and Female, for the above appointment, including practitioners within three months of qualification and liable under the National Service Acts, when appointment will be for a period of six months; otherwise it will not exceed one year. Salary is at the rate of £120 p.a., plus full residential emoluments.

Apply to MEDICAL SUPERINTENDENT.

Walsall General Hospital.

HONORARY GYNÆCOLOGICAL SURGEON.

Applications are invited for the post of Honorary Surgeon to the Gynæcological Department.

Candidates should be Fellows of the Royal College of Surgeons of England or Edinburgh and hold a special diploma in Gynæcology and Obstetrics.

An honorarium is attached to the appointment, which in the first place will be for the duration of the war.

Applications, together with testimonials, should reach the undersigned not later than 31st August.

R. C. MILLWARD, House Governor.

Pinderfields Emergency Hospital,

WAKEFIELD. (1517 Beds—700 Beds in commission.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant immediately. Salary is at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when the appointment will be for six months; otherwise it will not exceed one year.

Applications, with two testimonials, one of which should be from the Dean of the Medical School, should be sent to the MEDICAL SUPERINTENDENT, Pinderfields Emergency Hospital, Wakefield, Yorkshire.

County Council of Essex and Corporation OF CHINGFORD.

APPOINTMENT OF TEMPORARY ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH.

Applications are invited for the above appointment from persons not eligible for military service.

The minimum commencing salary as Assistant County Medical Officer will be at the rate of £400 a year, and the minimum commencing salary as Medical Officer of Health will be at the rate of £400 a year. The total salary of the person appointed will rise, subject to satisfactory service, by annual increments of £25 to a maximum of £900 a year. An allowance at the rate of £78 a year in respect of travelling will also be made to the successful candidate. The amounts of any increments in salary and the travelling allowance will be shared equally by the respective authorities.

The successful applicant will, in addition to his other duties, be required to undertake Civil Defence duties in the Borough of Chingford.

Applicants must be duly qualified medical Men, with experience in public health duties, and hold a Diploma of Public Health.

Applications must be made on the prescribed form, obtainable from the Clerk of the County Council, accompanied by copies of not more than three recent testimonials, which will not be returned, and should be delivered at the County Hall, Chelmsford, not later than 28th August, 1943.

JOHN E. LIGHTBURN, Clerk of the County Council.
GEO. E. MALLEY, Town Clerk.

County Hall, Chelmsford, 29th July, 1943.

Royal Cornwall Infirmary, Truro.

(330 Beds—5 Residential.)

Applications are invited from registered practitioners (Male or Female) for the appointment of HOUSE SURGEON (B2) to the OPHTHALMIC and EAR, NOSE, AND THROAT DEPARTMENTS with some general surgical duties, now vacant. Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners holding A posts (males must be rejected by the R.A.M.C.) may also apply, when appointment is limited to six months.

Applications should be addressed to the SECRETARY.

Royal Cornwall Infirmary, Truro.

(330 Beds—5 Residential.)

Applications are invited from registered practitioners (Male or Female) for the appointment of ORTHOPÆDIC AND CASUALTY HOUSE SURGEON (B2), now vacant. Salary is at the rate of £200 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Applications should be addressed to the SECRETARY.

July 28th, 1943.

General Hospital, Nottingham.

(585 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT ORTHOPÆDIC AND FRACTURE OFFICER (B1), vacant shortly. Applicants should have had previous experience in Fracture and Orthopædic work. The Orthopædic Department serves a large industrial district and the post offers exceptional experience in traumatic surgery. The appointment will be for a period of one year in the first instance. Salary is at the rate of £300 per annum, with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications, with three copy testimonials, to be forwarded as soon as possible to—

H. M. STANLEY, House Governor and Secretary.

Newport Mental Hospital, Caerleon, Mon.

Applications are invited from registered medical practitioners for the post of TEMPORARY ASSISTANT MEDICAL OFFICER (B1) at the above Hospital. Salary £500 per annum, rising by annual increments of £25 to £600, plus cost-of-living bonus of £16 per annum, together with full residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners now holding B1 appointments and rejected by R.A.M.C., may apply. The appointment will be subject to termination by one month's notice in writing.

S. M. T. BURPITT,
Town Clerk and Clerk to the Visiting Committee.

Town Hall, Newport, Mon.

Preston Royal Infirmary.

(404 Normal Beds—9 Residents.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 31st August. Salary at the rate of £150 per annum, with the usual residential emoluments. Duties under Consulting Surgeon. This post is recognised as approved experience for the F.R.C.S. examination. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications should be sent to: JOHN GIBSON, Superintendent.
Royal Infirmary, Preston.

Newark Town and District Hospital.

(70 Normal Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the following appointments, vacant 8th September:—

HOUSE SURGEON (B2). Salary is at the rate of £200 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

HOUSE SURGEON (A). Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications to: B. C. DION, Secretary-Superintendent.

Doncaster Royal Infirmary.

Applications are invited from medical practitioners (Male or Female) for the appointment of HOUSE SURGEON (A). The appointment will be for six months. Salary £175 per annum, with full residential emoluments. This large industrial area offers excellent opportunities for gaining experience. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, accompanied by not more than three testimonials, to be sent immediately to—

R. LANCASTER, Secretary-Superintendent.

The Prince of Wales's Hospital,

Greenbank-road, PLYMOUTH.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 24th September. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £252 per annum. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply. ARTHUR R. CASH, General Superintendent.

30th July, 1943.

Newcastle upon Tyne Eye Hospital.

Applications are invited for the position of HOUSE SURGEON (A) (Male or Female), at a commencing salary of £200 to £300 per annum (according to previous experience), all found. The staff consists of three House Surgeons and the Hospital is recognised for the purposes of the D.O.M.S. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, with testimonials, should be addressed to the SECRETARY, Eye Hospital, St. Mary's-place, Newcastle upon Tyne.

De-la-Pole Hospital

(FOR NERVOUS AND MENTAL DISORDERS),
WILLERBY, Near HULL.

Required immediately TEMPORARY MEDICAL OFFICER (B1) (Male) to replace one called up. Salary £8 8s. per week, plus full residential emoluments. Applications from male R practitioners holding B2 posts, also those holding B1 and rejected by the R.A.M.C., may apply.

Apply MEDICAL SUPERINTENDENT.

Gravesend and North Kent Hospital.

Applications are invited from registered medical practitioners, Male, for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £175 p.a., with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications should be addressed to the SECRETARY-SUPERINTENDENT.

Southport General Infirmary.

(150 Beds.)

Applications are invited from registered medical practitioners (Male, single) for the appointment of HOUSE PHYSICIAN (A), commencing 1st September. The salary is at the rate of £150 per annum, with full residential emoluments. R practitioners within three months of qualification and liable under the National Service Acts may also apply. The appointment will be for six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of recent testimonials, should be addressed to the SUPERINTENDENT, Infirmary, Southport.

Bedford County Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (B2), vacant 1st September. The salary is at the rate of £190 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Bedford. HORACE R. NEATE, Secretary.

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Surrey County Council Hospital Service.

PART-TIME DIRECTOR OF PHYSICAL MEDICINE at ST. HELIER COUNTY HOSPITAL, CARSHALTON (862 Beds) and KINGSTON COUNTY HOSPITAL (500 Beds).

Applications for the above appointment from doctors of high standing in the specialty of Physical Medicine should be sent to the County Medical Officer, County Hall, Kingston-on-Thames, by 31st August, 1943. Salary £1200 p.a.

The Director of Physical Medicine will be required to devote a minimum of twenty-four hours per week to the Council's service (eighteen hours at St. Helier Hospital and six hours at Kingston Hospital).

Applications will, however, be considered from candidates who can devote a substantial period to the duties at one or other of these hospitals, but who cannot give twenty-four hours per week to the Council's service. If a smaller number of hours per week is arranged the salary will be at a pro rata figure. The physiotherapy at St. Helier Hospital is a new department, including gymnasium and a wide range of treatment rooms.

DUDLEY AUKLAND, Clerk of the Council.

Lodge Hospital, Orsett, near Grays.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE OFFICER (B2). The salary is at the rate of £200 p.a., with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise it will not exceed one year.

Applications should be made in writing to the COUNTY MEDICAL OFFICER, County Hall, Chelmsford, and should include applicant's full name, age, nationality, qualifications, and details of previous posts (if any) and whether liable to service under the National Service Acts.

Rochdale Infirmary, Lancs.

The Board of Management invite applications from registered medical practitioners (Male and Female) for the appointment of SECOND HOUSE SURGEON (A), vacant shortly. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

The successful candidate will be required to be a member of a medical defence society. W. WYNNE, Secretary.

Royal Northern Infirmary, Inverness.

(298 Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the undermentioned appointments:—

HOUSE SURGEON (A), General, vacant 15th September.

HOUSE SURGEON (A), Ear, Nose, and Throat, vacant now.

Salary at the rate of £100 per annum, with residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may, subject to the approval of the Scottish Central Medical War Committee, also apply, when appointments will be for a period of six months.

Applications, with copies of three testimonials, as soon as possible to ACTING SUPERINTENDENT.

Ministry of Pensions.

The Minister of Pensions proposes to appoint a further limited number of MEDICAL OFFICERS to the unestablished staff of the Ministry for duties either at Headquarters or in the Provinces, and applications for appointment to these posts are invited from registered medical practitioners (Men or Women) who are ineligible for recruitment either on the ground of age or by reason of being medically unfit.

The salary for appointees willing to serve at any station in the British Isles will be £750 per annum, plus Civil Service war bonus, with opportunity for increase up to but not exceeding £900 per annum, provided approved services are rendered, for entrants who are not less than thirty-one years of age. The salaries of entrants who are less than thirty-one years of age would be adjusted according to their ages. Officers appointed to a particular locality who, for some reason, cannot be mobile, will receive a fixed salary of £750 per annum, plus war bonus.

On the termination of the war it may be decided to make appointments to established posts, and, if so, unestablished Medical Officers then on the staff of the Ministry, who fulfil the prescribed conditions as to age, &c., will be eligible, with others, for consideration.

Candidates selected for interview will be required to attend at Ministry Headquarters for the purpose at their own expense.

The appointment will be subject to the usual Civil Service conditions. Candidates should be registered medical practitioners of not less than five years' standing, and have held house appointments in general (preferably teaching) hospitals.

Canvassing through Members of Parliament or in other ways will render the candidate liable to disqualification.

Applications must be made on forms which can be obtained from the SECRETARY (M.S.), Ministry of Pensions, Norcross, Blackpool, Lancs.

Industrial Medical Officer (Male) wanted

for large Engineering Works near Glasgow about to develop a Medical Service. Commencing salary depends on qualifications and experience, but will be around £1000 p.a. Excellent scope under first-class conditions.—Apply, with copies of three recent testimonials to Address, No. 306, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

University of Otago, Dunedin, NEW ZEALAND.

Applications are invited for the following positions:—

PROFESSOR OF PHYSIOLOGY (salary £1500–£2000).

SENIOR LECTURER ANATOMY (salary £750–£900 or £1000).

SENIOR LECTURER PHYSIOLOGY (salary £750–£900 or £1000).

All salaries in New Zealand currency.

For full particulars apply to the HIGH COMMISSIONER FOR NEW ZEALAND, 415, Strand, London, W.C.2, by whom applications will be received up to the 31st August, 1943.

Aberystwyth General Hospital.

HOUSE SURGEON LOCUM required for 3 weeks from 21st or 31st August, 1943. Secretary.

Doctors, Male and Female, required

for duration Locums, Locums, and Assistantships, in Yorkshire, Lancashire, Wales, &c. Good salaries paid. Vacancies for Hospital Locums and Ships' Surgeons.—Write A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Long period Locum required for

Shropshire country. Salary £650 per annum, all found.—Write A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Assistant required, out-door, Male or

Female, for Practice on the Durham, Yorkshire border. Salary £750 per annum, including car. Many other Assistantships and Locums.—Write A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

M.D. (Prague), 30, 18 months' hospital

experience (H.S., H.P., C.O.), six months' G.P. experience (big panel and private practice), seeks Afternoon or Evening Surgeries in London region.—Address, No. 307, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Doctor's Secretary seeks position.

Dispensing experience. Interesting hard work required. Willing to learn new techniques.—Address, No. 304, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Medical Practices and Partnerships

for disposal; also Dental Practices. All classes of Insurance transacted.—Write A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Cardiff. Old-established General

PRACTICE for Sale. Panel approx. 1700; also considerable Private Practice.—Apply Arthur B. Watts, Gregory and Co., Incorporated Accountants, 12, Museum Place, Cardiff.

Gunnersbury Park, London, W.5.—

Desirable modern Freehold Residence for Sale. Would suit professional man, more particularly medical practitioner. Open position, direct route to town; lounge, dining, and 4 bedrooms, half-tiled kitchen, tiled bathroom, and downstair cloakroom, &c.; electricity (power) throughout; garage and good-sized front and rear gardens. Immediate possession. Price £2250. Vendor might consider letting furnished for time being. Apply by letter only—KENNEDY, GENESE & CO., Solicitors, 49, Queen Victoria-street, E.C.4.

For Sale, Infra-Red Radiant Heat

Lamp, with chromium-plated floor model stand, by John Bell & Croyden. Nearly new. Price £10. Can be seen.—54, Cotlesmore-court, W.8. WEStern 2646.

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urgently required, i.e., 28th March, 27th June, and 7th NOVEMBER, by ROBERT DINWIDDIE & CO., Dumfries, Scotland.

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house, or a private establishment, a home for old gentleman certified.—Address, No. 308, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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of excellent CONSULTING ROOMS are available for full and part-time use at moderate rents. Particulars on application.—ELGOOD & CO., 1, Bentinck-street, Welbeck-street, W.1. Welbeck 3974.

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